20 OCTOBER 1955 ONE SHILLING

ELECTRICAL TIMES

Transformers for U.S.A.

This 125 MVA transformer for 220 kV service for the City of Seattle is one of a number which The ENGLISH ELECTRIC Company is supplying to the United States of America.

'ENGLISH ELECTRIC'

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Transformer Department, Stafford

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WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

for **EVERY** *application . . .*

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FUSE SWITCHES

RATINGS
UP TO
500 AMPS.

A.S.T.A. certified
to BSS 88

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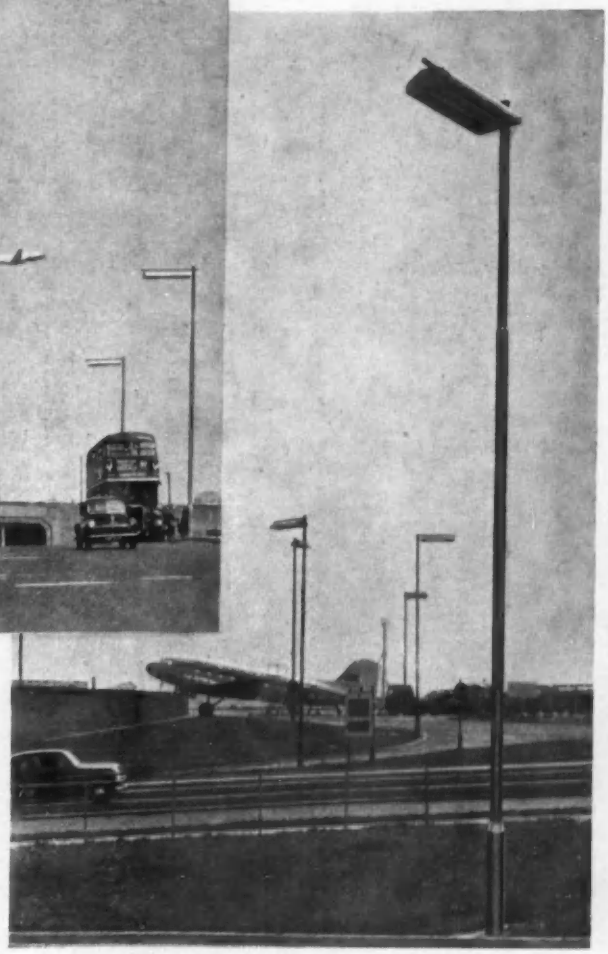
WEDNESBURY

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.



TUBULAR STEEL LIGHTING COLUMNS AT LONDON AIRPORT

This is one of a series of advertisements illustrating our range of tubular steel lighting columns.

Other designs, plain or fluted, for 13 ft., 15 ft., and 25 ft., mounting heights, will appear from time to time. A folder showing our standard columns will be sent on application.

Type Gb. 522 and Gb. 583 (modified), with G.E.C. cut off, fluorescent lantern, 30 ft M.H. for Group 'A' roads.

STEWARTS AND LLOYDS LIMITED

GLASGOW · BIRMINGHAM · LONDON

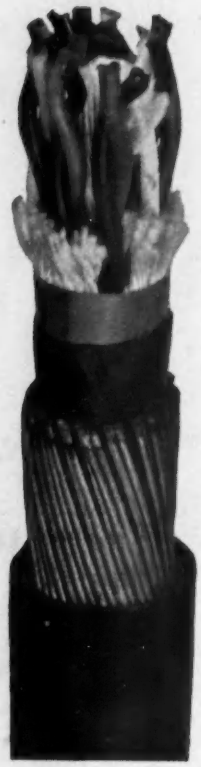
The largest manufacturers of steel tubes in Europe

S&L

PVC insulated telephone cable for installation in mine shafts.

for a tough job . . .

rely on GEON PVC



PVC insulated and sheathed lightweight telephone cable for in-bye installations.

Industry — by its very nature — is a hard task-master. In mining especially, the equipment, like those who work with it, must be able to do a man-sized job.

To take the hard knocks and to withstand abrasive wear even under the most arduous conditions, these cables are insulated and sheathed with Geon PVC.

In addition to doing a tough job well, Geon PVC makes a valuable contribution to general safety because of its inherent low flammability. Also for many industrial purposes it serves better than most materials because of its resistance to attack by acids, alkalis, oils, greases and solvents.

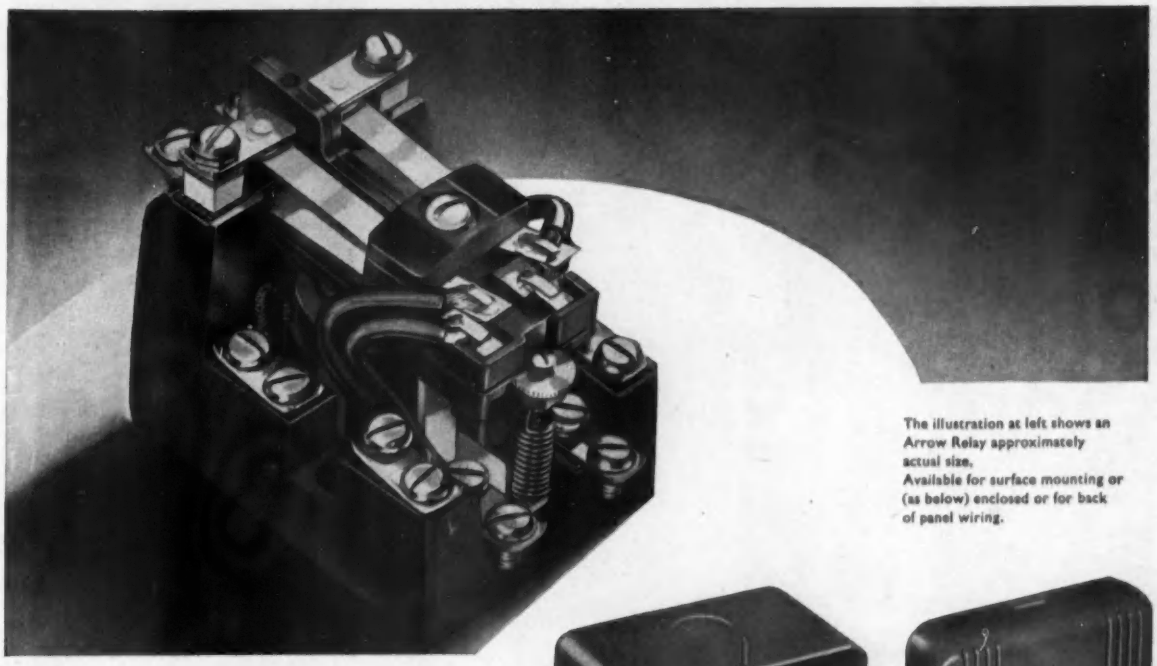
Both cables manufactured by St. Helens Cable & Rubber Co. Ltd., Slough, Bucks.

'Geon' is a Regd. Trade Mark

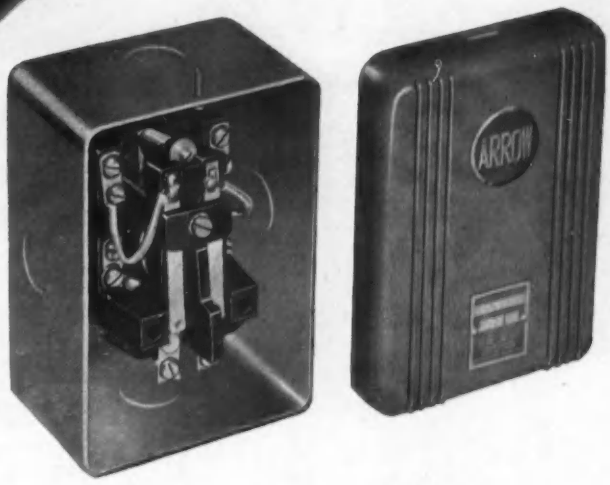
Geon PVC materials are polyvinyl chloride plastics. Write for descriptive Booklet No. 87 free on request.

BRITISH GEON LIMITED

SALES & TECHNICAL SERVICE: DEVONSHIRE HOUSE · PICCADILLY · LONDON W1 · TELEPHONE: MAYFAIR 8867

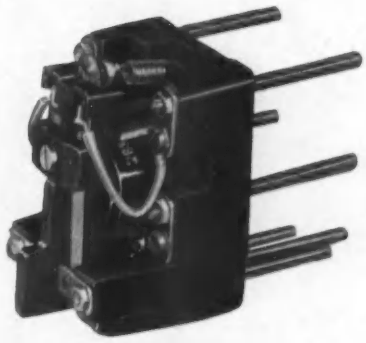


The illustration at left shows an Arrow Relay approximately actual size.
Available for surface mounting or (as below) enclosed or for back of panel wiring.



Relays for long and silent service . . .

Made by skilled craftsmen from first-quality materials, Arrow Relays, like all Arrow products, are individually produced; they are designed and built to ensure exceptionally long and silent service. Essentially compact, no less than thirty different circuit arrangements are available on the standard base. Silver-to-silver butt type contacts give continuous rating up to 10 amps per pole at 230 volts AC. Operating coils, of low wattage consumption and continuously rated, are available for 6 to 550 volts AC and 6 to 230 volts DC.



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SEND FOR NEW CATALOGUE MS9

ARROW ELECTRIC SWITCHES LTD · HANGER LANE · LONDON · W5

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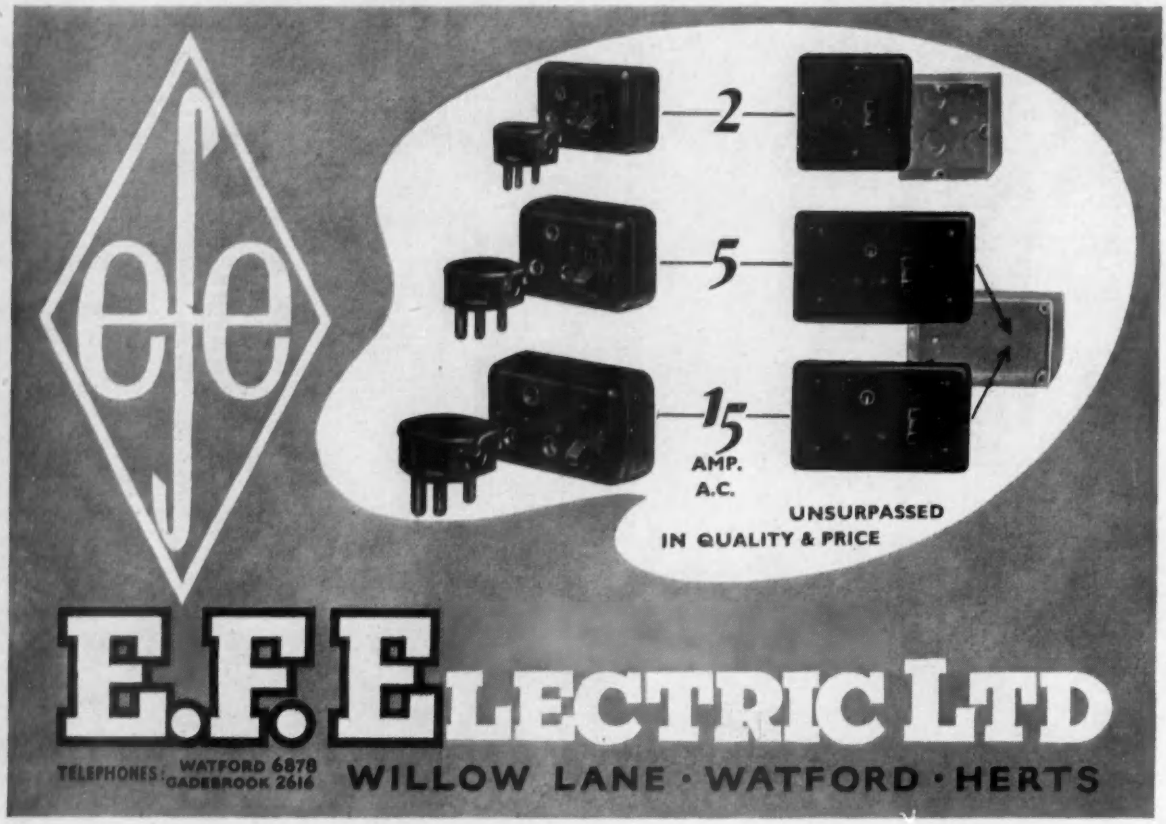

E.F.E ELECTRIC LTD

TELEPHONES: WATFORD 6878 GADEBROOK 2616

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Diesel Electric Generating Plant

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2·5 kW - - £345
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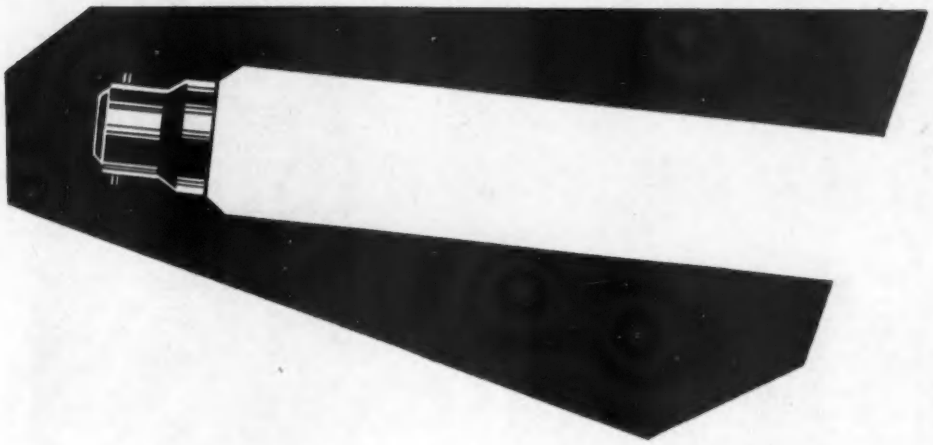
LONDON: Imperial House, Kingsway Telephone: TEMple Bar 9681 Also at STAMFORD, GLASGOW and DUBLIN



Stock Confidently—Sell Easily

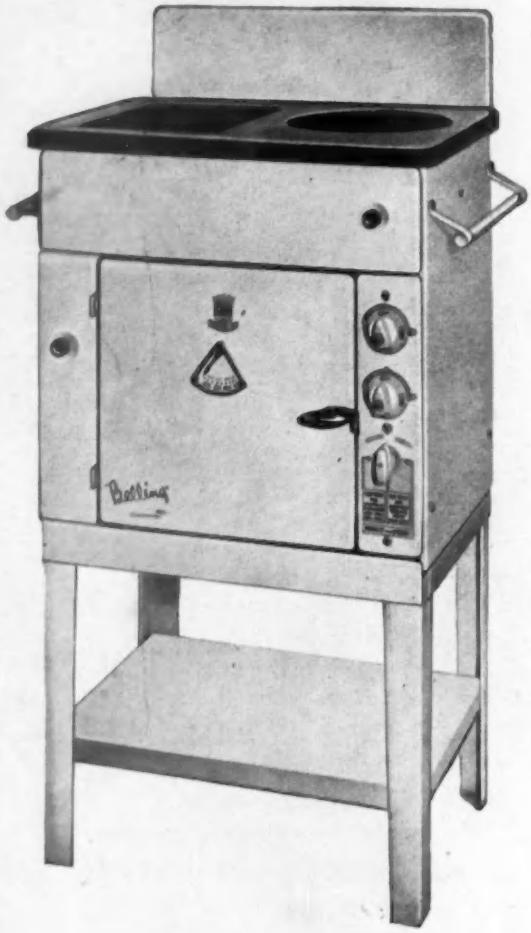
The high quality of
Elasta Lamps and Tubes,
obtained by nearly
fifty years' experience in lighting,
means that your customers'
homes, offices and factories
will be well lighted.
Stock wisely — stock Elasta.

Elasta
LAMPS
AN E.L.M.A. BRAND

Tungsten Filament and Fluorescent

POPE'S ELECTRIC LAMP CO. LTD. *Head Office: 5 Earnshaw Street, New Oxford Street, London, W.C.2*
Branches: Manchester, Leeds, Leicester, Birmingham, Bristol, Belfast (Northern Ireland)

BIG BABY "BELLING" sales ahead



There will certainly be very big Big Baby Belling sales ahead. Production on our new assembly lines is rapidly increasing and the delivery position is getting better and better. The demand for the Big Baby has exceeded all expectations. No wonder—it has the cooking capacity of a full size cooker yet will work off any power point * and costs only £19.17.6d. The independently heated oven produces roasting and baking that's second to none in its class. In fact the results from this splendid cooker compare favourably with any cooker at any price.

* *Patent interlocking device limits current automatically so that the cooker can be safely operated from a 13 amp power point.*
- *Large independent extra quick heating oven. Oven is ready for use in 15 mins.*
- *8" solid type boiling plate and combined grill-boiler.*
- *Large hotcupboard for plates and food.*
- *Useful plate warming compartment beside oven.*
- *Supplied on Stand with utensil shelf.*
- *Handy Towel Rail on either side of oven is included in the price.*
- *£19 · 17 · 6 including Stand—subject to usual Baby Belling discounts.*

you can't beat a "Belling"

Belling & Co. Ltd. Bridge Works, Enfield. Middx. Howard 1212

CBC 410

R.E.A.L.

AND NOW - another record PLINTH sales season...

WITH A PERFECT WRAP IN A PERFECT PACK TO HELP YOU!

Each R.E.A.L. Plinth is proofed against moisture and dust by a pleated cellophane wrap that permits full inspection and handling before purchase, and maintains the immaculate condition of the Plinth itself. Now the standard method of dispatch, these rail certified containers hold 12 Plinths of a size, in a colour assortment that mirrors the public demand: 6 Pastel Cream, 2 Gilt Lustre, 2 Eggshell Black, 1 Pastel Rose and 1 Pastel Blue. This is our recommended assortment but, of course, any selection can be supplied. Broken quantities carriage extra, plus part cost of packing.

The R.E.A.L. Plinth 11½" dia. at base
List No. 5000 **36/9d.** each including P.T.

The Junior Plinth 6½" dia. at base
List No. 5002 **28/-** each including P.T.

Patent No. 659,876

Specially appointed distributors are carrying stocks in every part of the Country.

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Issued by Rowlands Electrical Accessories Ltd., R.E.A.L. Works, BIRMINGHAM 18

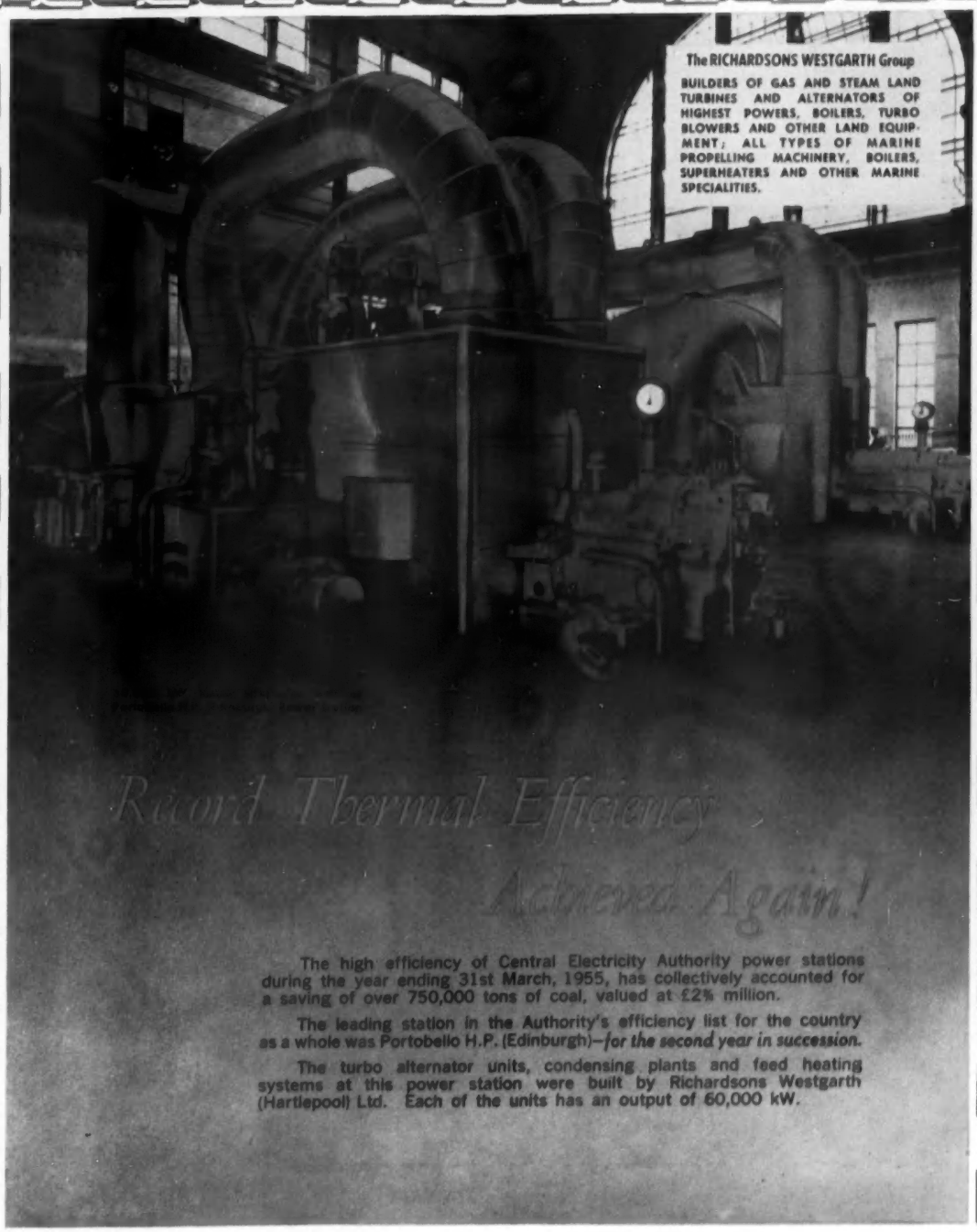
LIGHTING

In Banks, as in all buildings in which sudden darkness can impose the risk of theft, emergency lighting is a necessary precaution. In bank buildings of the future the standby electrical system will be planned at the same time as the main lighting is planned. Chloride Batteries Ltd, makers of Keepalite, the automatic emergency lighting system, offer the advisory services of their engineers to architects and electrical contractors in any part of Britain.

Keepalite

FOR BANKS

A Product of Chloride Batteries Limited, Exide Works, Clifton Junction, Swinton, Manchester and Grosvenor Gardens House, Grosvenor Gardens, SW1


The RICHARDSONS WESTGARTH Group
BUILDERS OF GAS AND STEAM LAND TURBINES AND ALTERNATORS OF HIGHEST POWERS, BOILERS, TURBO BLOWERS AND OTHER LAND EQUIPMENT; ALL TYPES OF MARINE PROPELLING MACHINERY, BOILERS, SUPERHEATERS AND OTHER MARINE SPECIALITIES.
Record Thermal Efficiency . . Achieved Again!
The high efficiency of Central Electricity Authority power stations during the year ending 31st March, 1955, has collectively accounted for a saving of over 750,000 tons of coal, valued at £2¾ million.
The leading station in the Authority's efficiency list for the country as a whole was Portobello H.P. (Edinburgh)—for the second year in succession.
The turbo alternator units, condensing plants and feed heating systems at this power station were built by Richardsons Westgarth (Hartlepool) Ltd. Each of the units has an output of 60,000 kW.

RICHARDSONS WESTGARTH (HARTLEPOOL) LTD.

RW NEM GC

ASSOCIATED COMPANIES:-

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R.L.S.

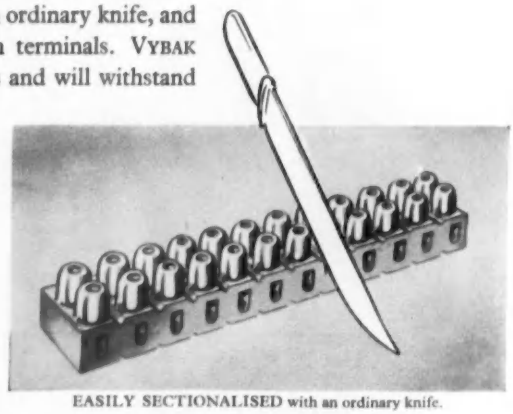
Over the bumps

...round the bends

...along the twists

this Flexible Terminal Block made from VYBAK compounds goes where you want it to go

This flexible terminal strip produced by Belling and Lee Limited was moulded from VYBAK Injection Moulding Compound VX309 — a versatile material made by Bakelite Limited. The resilience of the material not only enables the block to fit curved and irregular surfaces but also to grip the screws so firmly that they cannot be shaken out, even when the block is mounted upside-down. The block can be cut with an ordinary knife, and fixing is easily carried out using the holes between terminals. VYBAK Compound VX309 has excellent electrical properties and will withstand high working voltages even in thin sections. Resistance to mechanical shock and vibration, excellent chemical and fire resistance together with good ageing properties, make VYBAK Compound VX309 a material of immense possibilities in electrical and radio engineering. *You are invited to write for further details.*



EASILY SECTIONALISED with an ordinary knife.

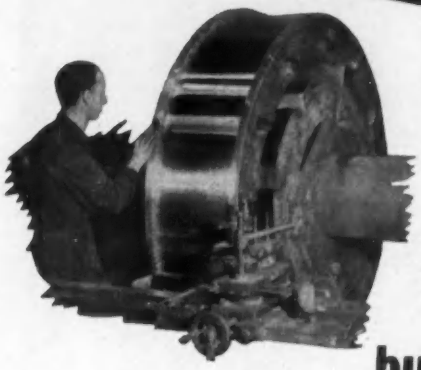
VYBAK REGD. COMPOUNDS

BAKELITE LIMITED

12-18 GROSVENOR GARDENS, LONDON, S.W.1. TEL: SLOANE 0898

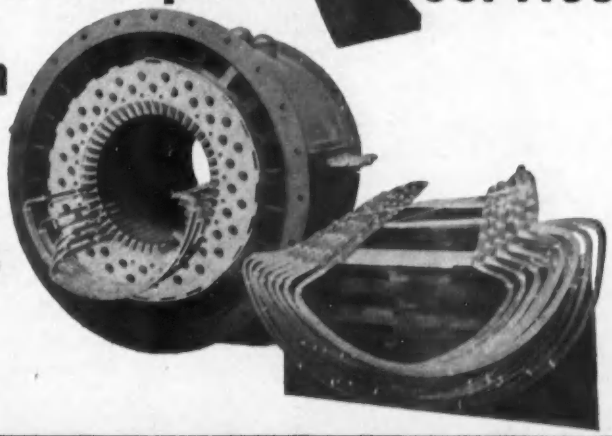
***Vybak** Products include: **Vybak** rigid and flexible pvc compounds for moulding and extrusion; **Vybak** calendered sheet; **Vybak** flexible pressed sheet —coloured or transparent; **Vybak** heavy grade industrial rigid sheet.*

YGA C8



we haven't left room to say much but if you need electrical repair services

get in touch with the nearest of these addresses



B.E.R.L BRITISH ELECTRICAL REPAIRS LTD.

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General Manager: A. Sorley.

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Bellott's Road Works, off Lower Bristol Road, Bath. Tel.: Bath 61232. District Manager: R. T. W. Anderson.

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MANAGING DIRECTOR DAVID C.Y. HIGGS, A.M.I.E.E.

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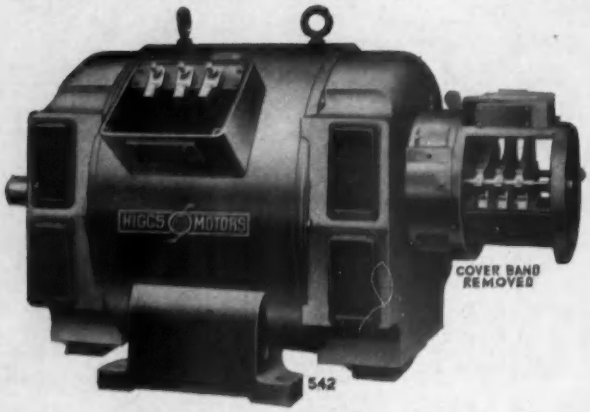

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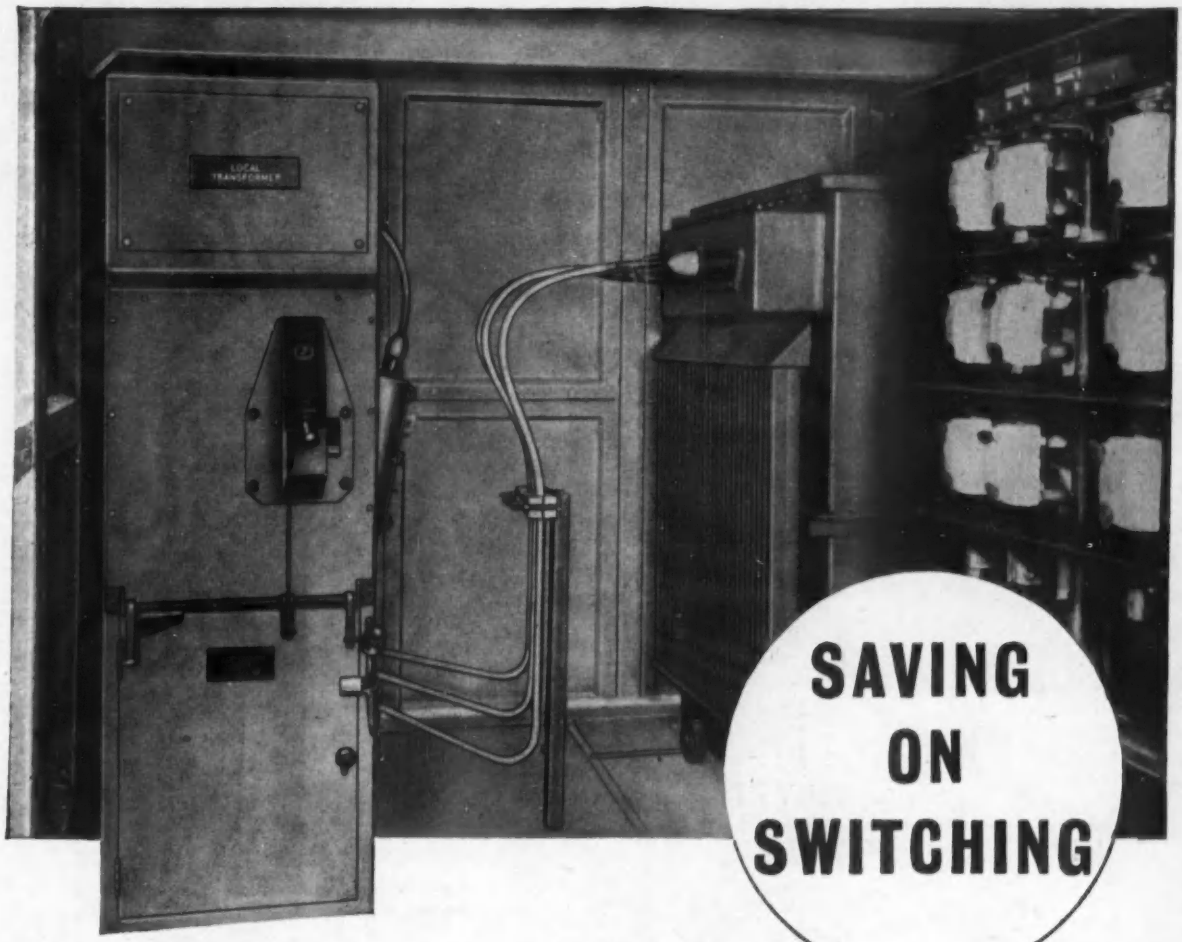

SAVING ON SWITCHING

Here is a practical example of how the East Midlands Electricity Board save on sub-station costs, with a J. & P. Fuse-Switch Unit housed in a pre-fabricated concrete building.

The J. & P. Fuse-Switch is a simple, low-priced unit for systems up to 11 kV and up to 250 MVA, ideal for small installations where a circuit-breaker unit is not justified.

J. & P. METALCLAD FUSE-SWITCH UNIT TYPE FS with air-insulated H.R.C. FUSES

Air-insulated fuses have many advantages; they can be easily inspected, there is no chance of oil entering the fuse cartridge, and fire hazards are reduced.

The unit includes an oil switch which opens when any of the fuses operate. Rated at 400 amperes, and insulated for 11 kV service voltage, its performance is in accordance with B. S. 116/1937.

A full complement of positive interlocks is provided, giving complete safety, and the interlocking mechanism is clearly visible so that the operator can observe the correct sequence.

J. & P. Engineers will be pleased to study individual problems and advise on the choice of fuse rating.

The mark that means that "little more" in quality

JOHNSON & PHILLIPS LTD.
CHARLTON, LONDON, S.E.7
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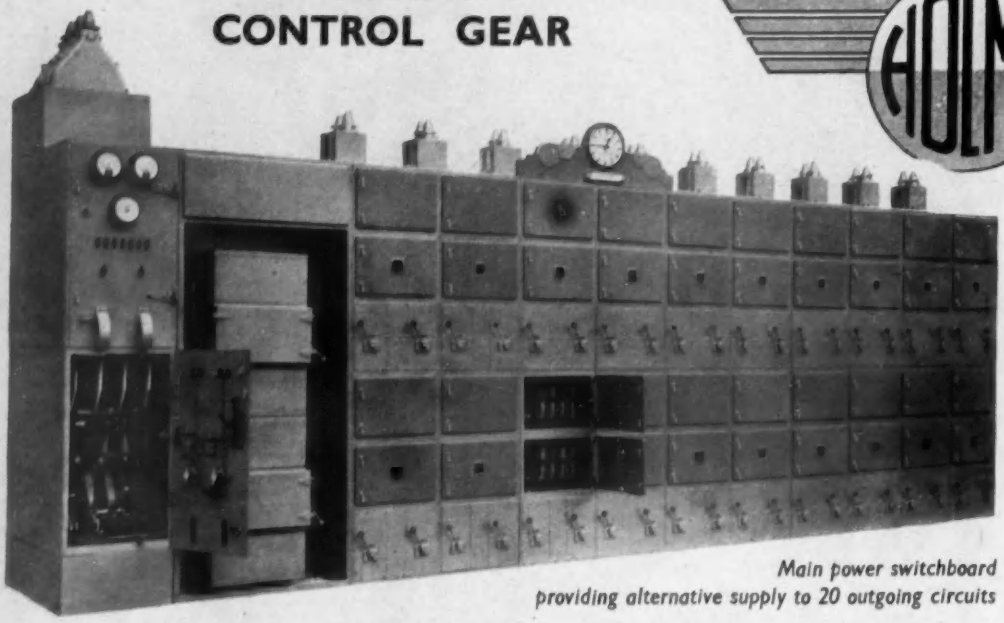
ELECTRICAL ENGINEERS AND CABLE MAKERS

AUTOMATIC CONTROL GEAR

HOLME



Main power switchboard providing alternative supply to 20 outgoing circuits

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ALTRINCHAM · ENGLAND

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THE *Eterna* LOUVRED FLUORESCENT FITTING

...introduced

for special use in stores, offices and showrooms is also suitable for industrial applications where appearance is equally important.

● In addition to the standard finish of hard gloss white, ETERNA Louvred Fittings are available in various colours and in the following sizes:—

4 ft. for TWIN 40 Watt Lamps
5 ft. „ „ 80 „ „
5 ft. „ THREE 80 „ „
5 ft. „ FOUR 80 „ „

● All ETERNA Louvred Fittings incorporate our well known Grade "A" H.P.F. Control Gear completely enclosed in chassis for dust exclusion. Side panels are of luminous glass removable for easy cleaning and lamp replacement. Provision is made for chain or conduit suspension.

● Other ETERNA models available. Also full range of Fluorescent Control Gear and Accessories.

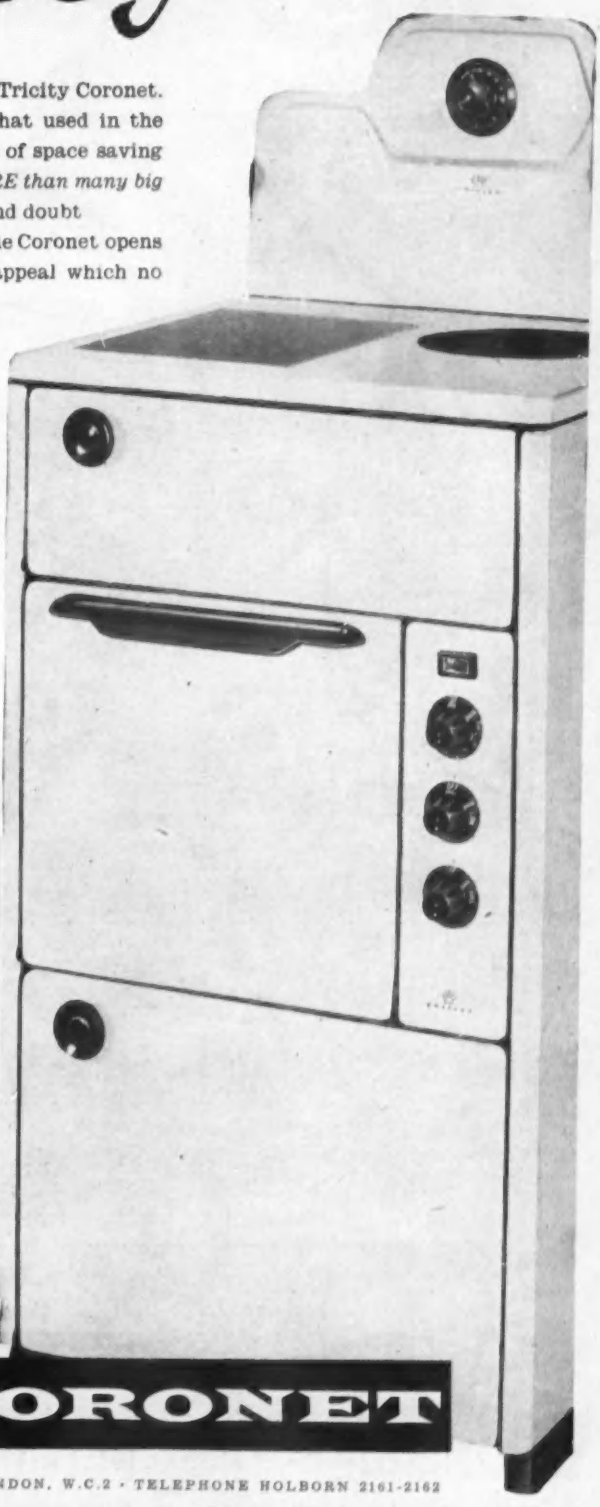
ENSEL ELECTRIC CO. LTD.

218-219 Upper Street, London, N.1 *Phone: CANonbury 2251/2*

ILLUSTRATED BROADSHEET FOR THIS AND OTHER 'ETERNA' FITTINGS AVAILABLE ON REQUEST.

It's new—it's 33 gns

There is not another cooker to compare with the new Tricity Coronet. Low priced, with time-switch control identical to that used in the famous Tricity Queen and—revolutionary idea—a set of space saving 'Phoenix' ovenware that enables the oven to hold *MORE than many big cookers* It has been tested, proved and acclaimed beyond doubt
Look at the price again and consider the big market the Coronet opens up to time controlled cookers Think of its unique appeal which no housewife can resist The demand is big already and will continue to grow Order now and be sure of quick and steady sales



* TIME SWITCH CONTROL

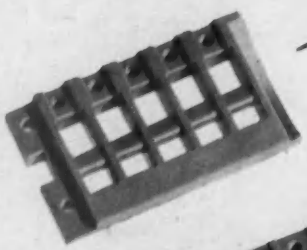
* UNIQUE SPACE-SAVING OVENWARE

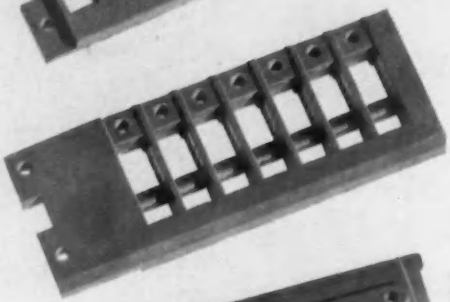
The special ovenware supplied with the Tricity Coronet (and only the Coronet) comprises
2 'Phoenix' Glass Casseroles
1 'Phoenix' Glass Baking Dish
2 Swiss Roll Tins
2 one doz. Patty Tins
2 Sandwich Tins and
One heat resisting oven glove.

TRICITY CORONET

Thorn TRICITY COOKERS LIMITED, 109 KINGSWAY, LONDON, W.C.2 · TELEPHONE HOLBORN 2161-2162

ALKYDS?





FLAME RESISTANT

LOW LOSS

NON-ABSORBENT

ECONOMICAL

The alkyd group has many qualities that make these resins particularly attractive for use in components for the electrical and radio industries. We can now produce alkyd mouldings for direct or indirect export purposes and for government projects. Our advisory service is at your disposal.

COSMOCORD LIMITED

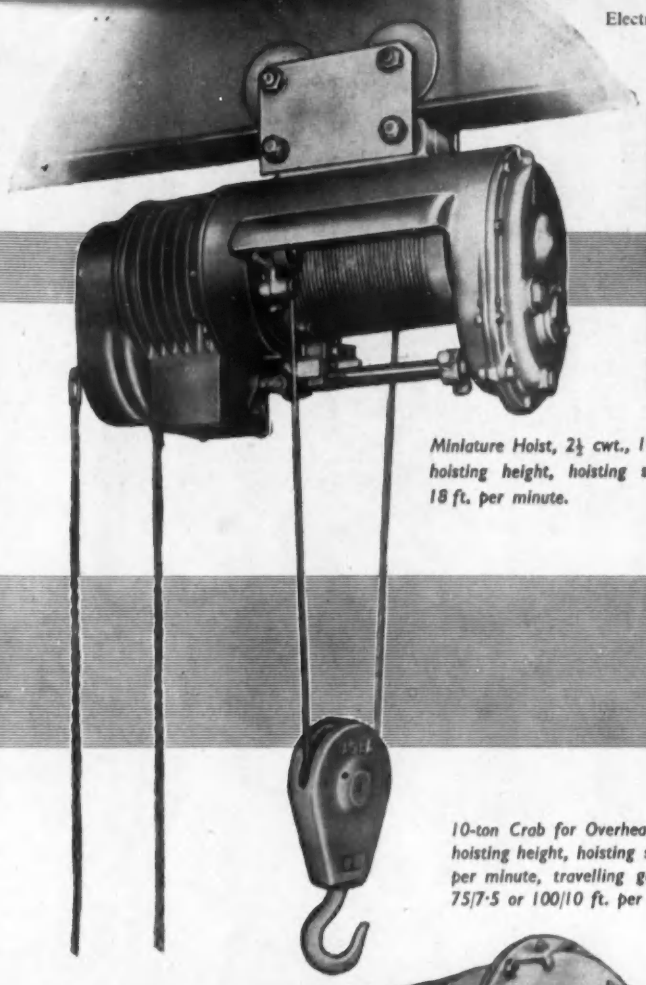
(Plastics Moulding Division)

Cambridge Road, Enfield, Mddx. **Tel: Enfield 4022**

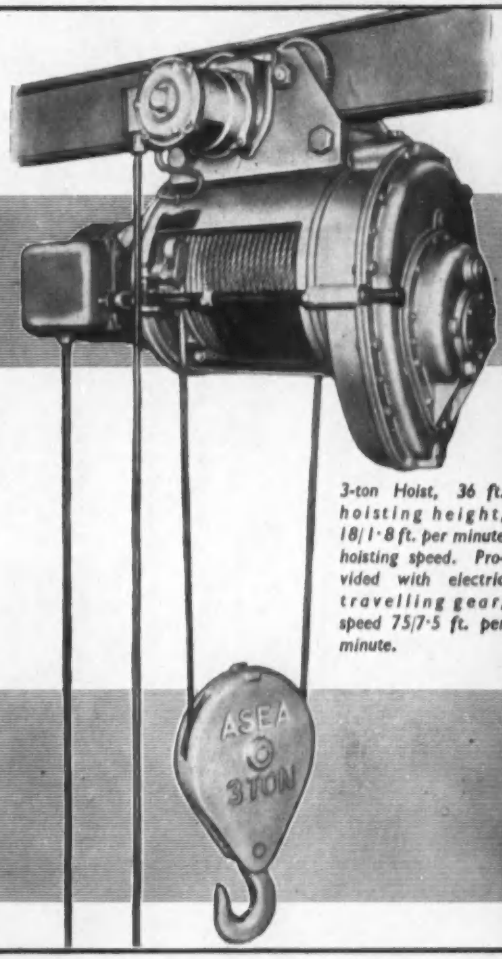
a complete range of power

LIFTING EQUIPMENT

2½ cwt. to 10 tons

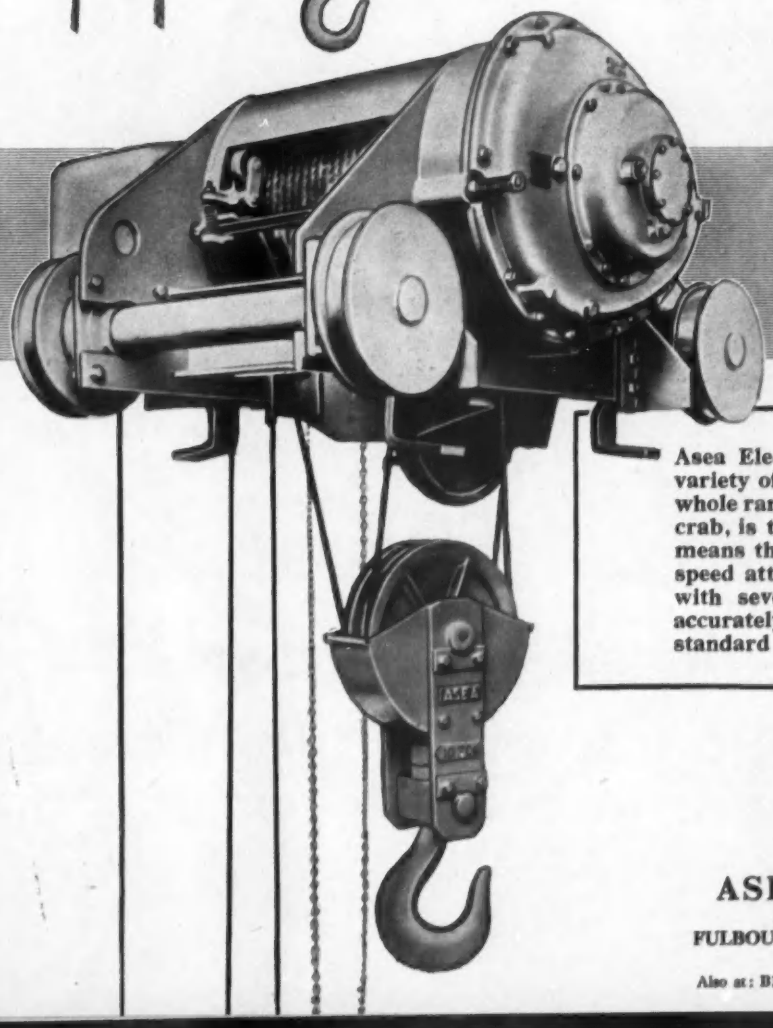


Miniature Hoist, 2½ cwt., 18 ft. hoisting height, hoisting speed 18 ft. per minute.



3-ton Hoist, 36 ft. hoisting height, 18/1·8 ft. per minute hoisting speed. Provided with electric travelling gear, speed 75/7·5 ft. per minute.

10-ton Crab for Overhead Crane, 28 ft. hoisting height, hoisting speed 11/1·1 ft. per minute, travelling gear speed 50/5, 75/7·5 or 100/10 ft. per minute.



Asea Electric Hoists and Crabs are installed in a wide variety of industrial plants. An important feature of the whole range, from the 2½ cwt. miniature hoist to the 10-ton crab, is that all working parts are totally enclosed. This means that our standard designs, with optional creeping speed attachment, are particularly suitable for locations with severe atmospheric conditions. All units include accurately machined rope-barrel and provide a high standard of reliable performance.

ASEA

ASEA ELECTRIC LIMITED

Associated with Fuller Electrical and Manfg. Co. Ltd.

FULBOURNE ROAD, WALTHAMSTOW, LONDON, E.17

Phone: LARkswood 2350 (10 lines)

Also at: BIRMINGHAM : GLASGOW : MANCHESTER : DUBLIN

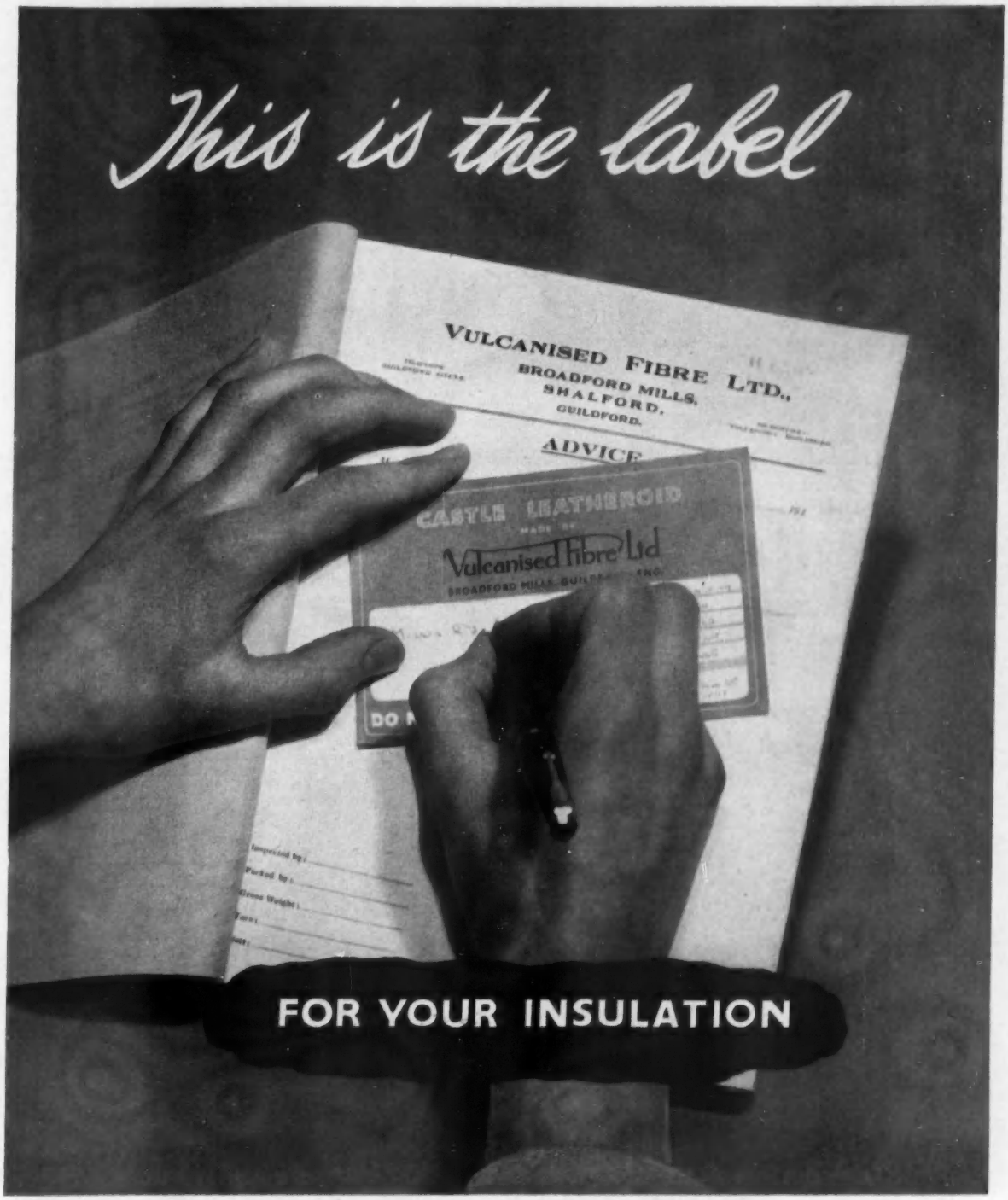
PJ

STEEL SHEETS

for the

ELECTRICAL
INDUSTRY

PARTRIDGE JONES
&
JOHN PATON LTD
PONTNEWYNYDD NR PONTYPOOL
TELEPHONE PONTYPOOL 131/2



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E.C.4
Phone:
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Vulcanised Fibre Ltd
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MAKERS OF 'CASTLE' VULCANISED FIBRE SHEETS, RODS, TUBES, LEATHEROID AND MACHINED COMPONENTS

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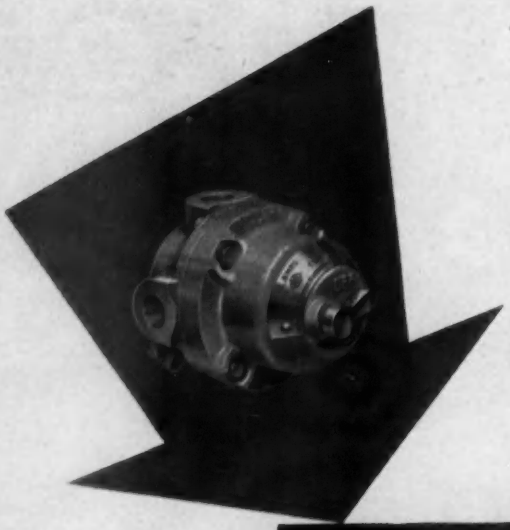

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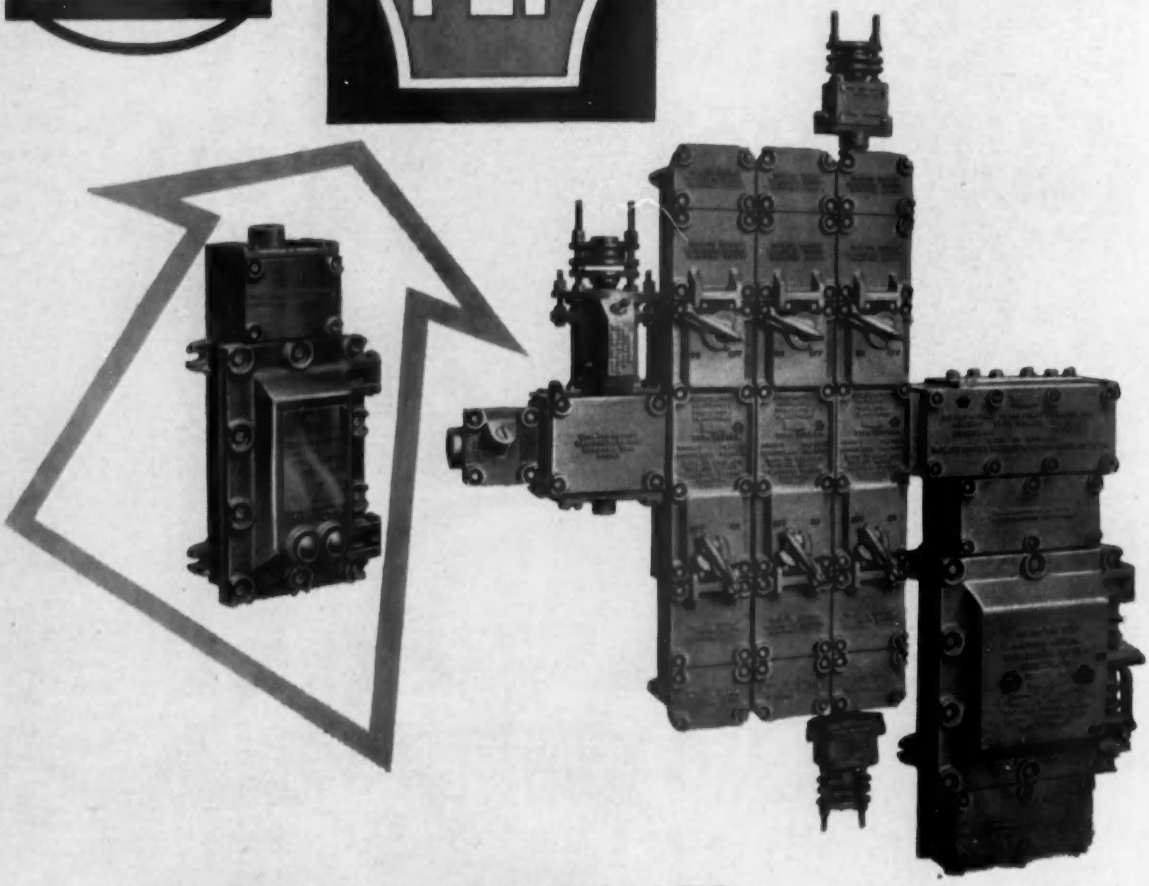
FLAMEPROOF EQUIPMENT

Units from the large and varied range of "Walsall" Electrical products for "Flameproof" Installations :

1. 5 amp. "Pygmy" Switch.
2. Air-Break Contactor Starters up to 15 amp., with or without isolators, fuses and meters.
3. 15 amp. D.P. "Midget" Multiple Switch-fuse assemblies.

Walsall

FLP



WALSALL CONDUITS LTD.

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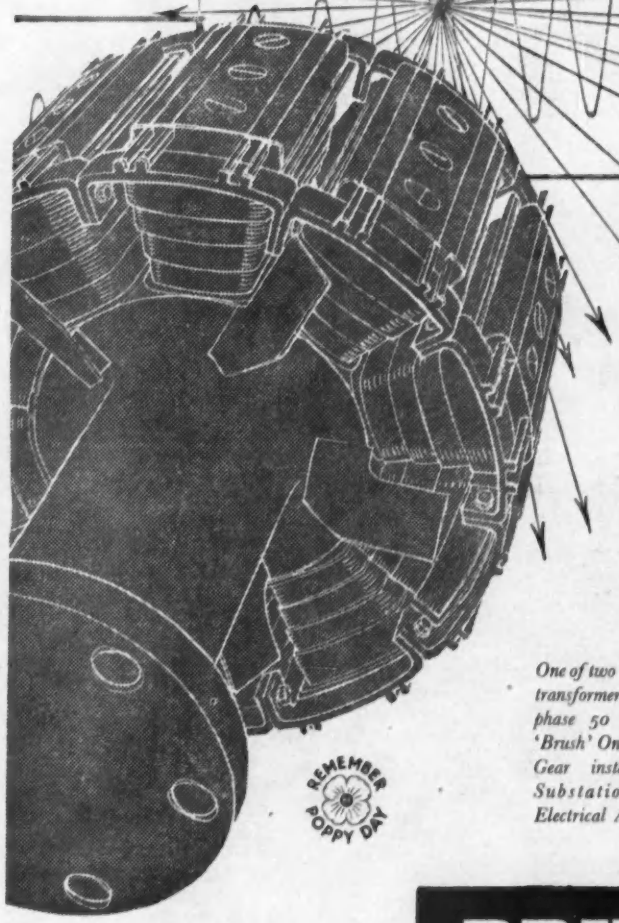
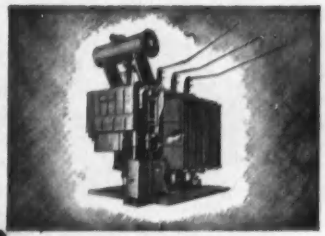
THE POWER BEHIND BRUSH . . .

TESTING



From laboratory prototype to production unit all Brush manufactured equipment is subjected to a rigorous testing process. It is this strict system of tests and controls at all stages that results in the outstanding performance of Brush units under the toughest operating conditions all over the world. Today, the up-to-date production facilities and skilled engineers of the Brush Electrical organisation are joined to a vigorous development policy and a thorough grasp of world requirements. That is why Power Engineers all over the world increasingly look to Brush to provide them with the reliable job-tested type of Power Equipment they need.

One of two 'Brush' 10,000 kVA transformers 33/11.5 kV, 3 phase 50 cycles, fitted with 'Brush' On Load Tap Changing Gear installed at Lawford Substation of the Central Electrical Authority.



REMEMBER POPPY DAY

Whatever your power problem . . . consult

BRUSH

TRANSFORMERS · SWITCHGEAR · MOTORS
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Contractors to the

G.P.O. — NATIONAL COAL BOARD — BRITISH RAILWAYS.
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In Association with BRYCE ELECTRIC CONSTRUCTION COMPANY LTD.

"We're a success on the boards, Mr Ash!"

"And we mustn't let the customers forget it, Mr. Downs."

" In particular we recommend our "ASHLAM" G.S./C.5. Silicone Bonded Glass Fabric Laminated Board."

" That's a lot of words, Mr. Downs."

" G.S./C.5. has a lot of uses, Mr. Ash. High temperature resistance and low loss qualities make it, electrically speaking, one of the most outstanding performers in the country. It's quite amazing the number of parts G.S./C.5. plays in industry today."

"Amazing, Mr. Downs? Nothing would amaze me in our business. You've learned, and I've learned, and a lot of other people have learned . . ."

If you want to know about "ASHLAM"

ask Ashdowns

"ASHLAM" is the registered trade mark of ASHDOWNS LIMITED.

ASHDOWNS LIMITED, ECCLESTON WORKS, ST. HELENS, LANCS. Tel: St. Helens 3206. *Ashdowns Limited is a subsidiary of Pilkington Brothers Limited.*

Here's Tich!

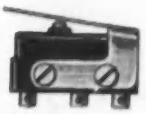
THE MINIATURE MICRO SWITCH ... *reproduced actual size*

V4 micro switches are smaller than your thumb nail—12 of them can be accommodated in an ordinary matchbox! This new switch has been designed for all applications where space is at a premium. They may be mounted in banks for multi-pole switching arrangements or singly for limiting travel, controlling sequences, or initiating safety devices. Plain lever or roller-lever auxiliary actuators are also available and their use is recommended when actuation is by cams or other similar devices.

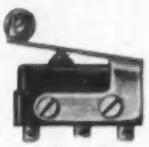
Write for descriptive leaflet M.S.15.D.

The Burgess range of micro switches consists of scores of types, for thousands of applications and millions of operations.

V4



With V4LI actuator



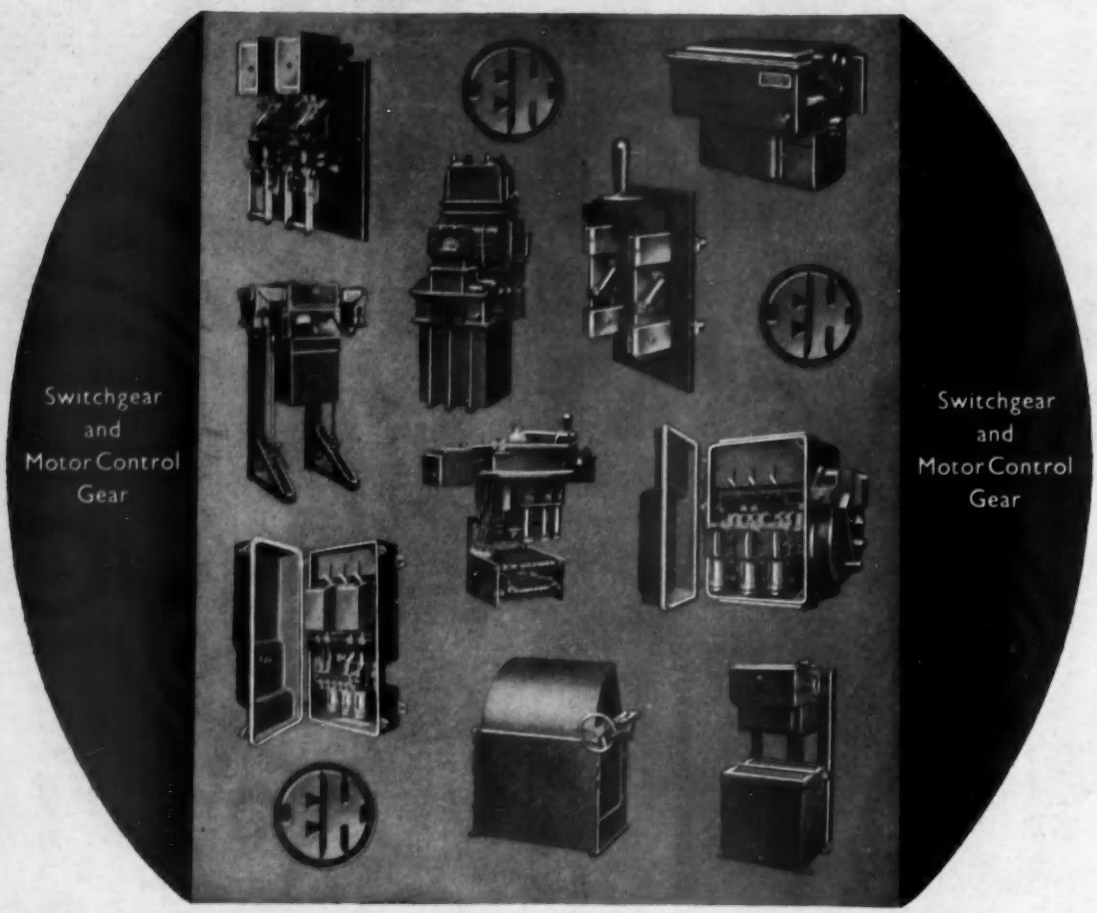
With V4LRI actuator

BURGESS MICRO-SWITCHES

BURGESS PRODUCTS CO. LTD. *Micro Switch Division · Dukes Way · Team Valley · Gateshead 11 · Telephone : Low Fell 75322*

Standardise on "Erskine Heap"

SPECIALISTS IN THE MANUFACTURE OF SWITCHGEAR SINCE 1905



It's the Switchgear engineers like to "Live" with

L.T. SWITCHGEAR *50/5000 AMPERES*
E.H.T. SWITCHGEAR *up to 11 kV 250 MVA rupturing capacity*
MOTOR CONTROL GEAR *¼/5000 H.P.*

May we have your enquiries?

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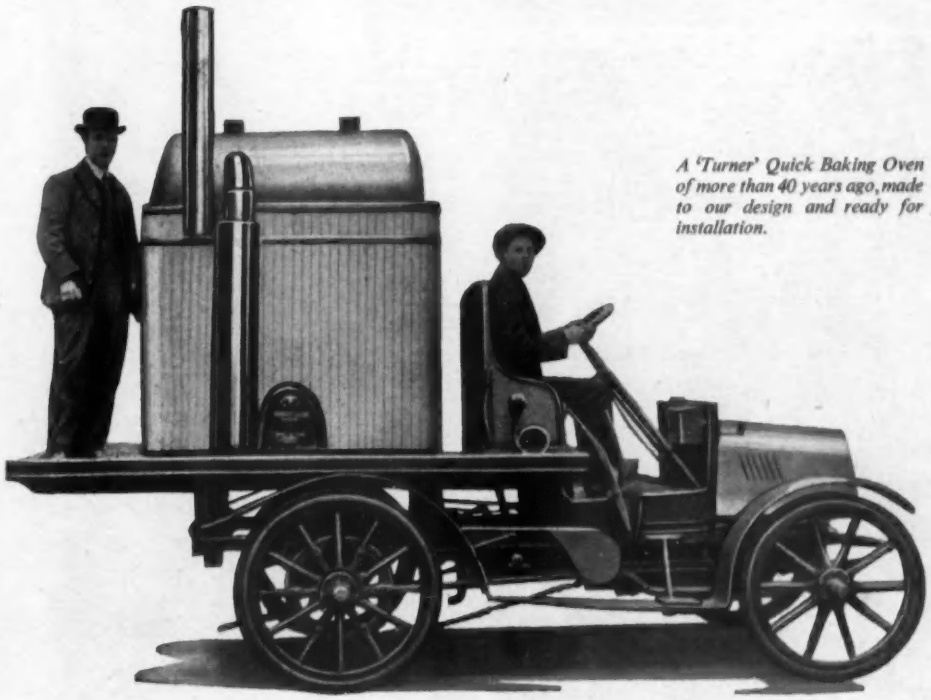
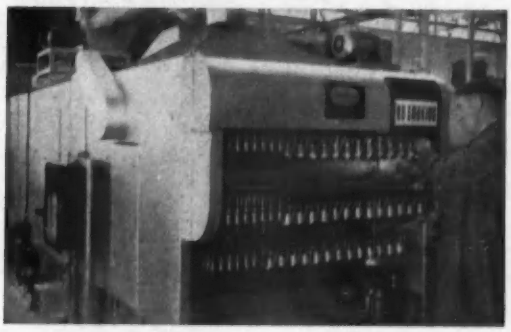


A 'Turner' Quick Baking Oven of more than 40 years ago, made to our design and ready for installation.

We started it

and not only the, er—vehicle ! Over 60 years ago STERLING began to specialise in the production of insulating varnish, culminating today in a world-wide service. Varnish manufacture, whilst still the basis, is now but a part—STERLING Chemists and Engineers give a complete service to the large or small user. They ensure that the best type of varnish is made for your needs and that it is applied by the most efficient and economic plant. You are invited to make full use of their services.



A typical up-to-date STERLING installation—impregnating 20,000 field coils and armatures per week by the cold dip and bake process, at Messrs. S. Smith and Sons (Eng.) Ltd.

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INSULATING
VARNISHES

THE STERLING VARNISH CO. LTD.

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PUZZLE:-

find the gear

Don't worry about it too long – there isn't any gear. Not a choke anywhere. Not a single P.F. capacitor. Not a starter. For with Philips "Gear-less" Fluorescent Lighting all that's needed is a fluorescent lamp in series with a tungsten lamp! It's as simple as that.. yet what a magnificent light it gives!

Philips "Gear-less" Lighting is three times lighter in weight than standard fluorescent lighting–yet costs only half as much. And that means it's suitable for all sorts of fresh applications.

Get in touch with Philips right away!

So many sales features

- *Lowest priced fluorescent lighting*
- *Fluorescent lamp and filament lamp can be fixed separately or together, as desired*
- *Absolutely noiseless in operation*
- *Very light in weight*
- *No control gear or starter switch required*
- *With Deluxe Warm White lamp gives perfect colour rendering for the display of food*
- *Light equal to two 100 watt filament lamps for only 115 watts.*

"GEAR-LESS" FLUORESCENT LIGHTING

from PHILIPS

PHILIPS

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TUNGSTEN, FLUORESCENT, BLENDED AND DISCHARGE LAMPS & LIGHTING EQUIPMENT · RADIO AND TELEVISION RECEIVERS, ETC.

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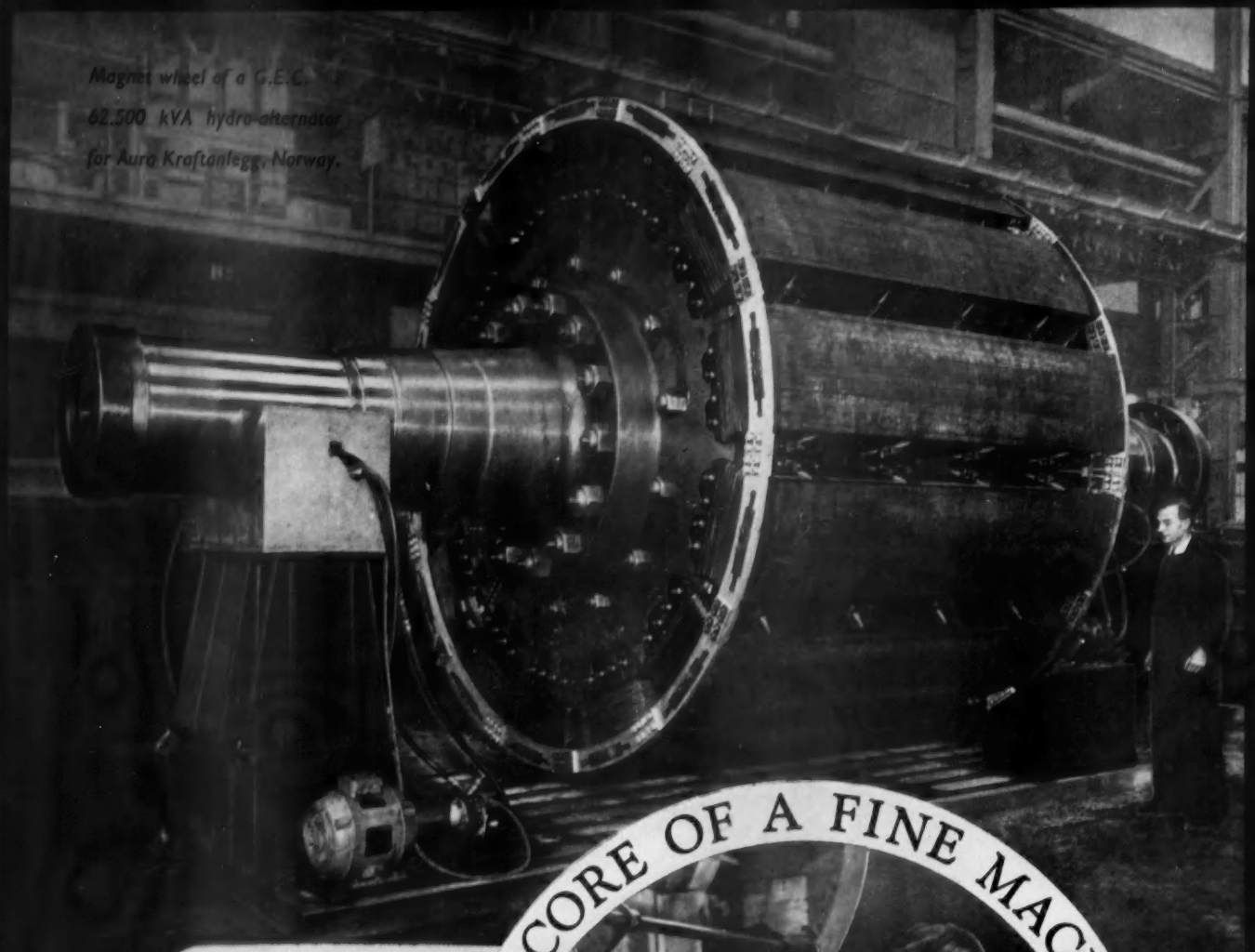
THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2



Magnet wheel of a G.E.C. 62,500 kVA hydro-alternator for Aura Kraftanlegg, Norway.

THE CORE OF A FINE MACHINE

LAMINATIONS BY

LAMINATIONS of all types, in all sizes and in all grades of material.

FERROSIL cold-reduced electrical sheet and strip.

ALPHASIL cold-reduced oriented electrical sheet and strip

RICHARD THOMAS & BALDWINS LTD.

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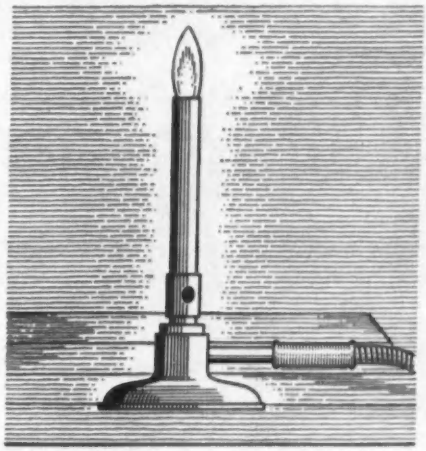
RTB

Progress in design



The introduction of the Bunsen gas burner was a notable advance and the electric "Bunsen" (manufactured by Electrothermal Engineering Ltd.) is a further step forward in the development of laboratory equipment. Its advantages are ease of control, cleanliness, lack of smell and ability to operate where no gas supply is available. The heating element is of Brightray "C", one of the range of Wiggin nickel-chromium resistance materials. There is a grade of Brightray to suit all industrial and domestic heating applications. Let us help to select the one most suitable for *your* requirements.

BRIGHTRAY C for intermittent heating and cooling cycles up to 1150°C: particularly suitable for fires, irons, cookers, heating plates, etc.

BRIGHTRAY S for electric furnace elements working almost continuously at temperatures up to 1150°C.

BRIGHTRAY B for all types of element where temperature does not exceed 950°C.

BRIGHTRAY F for furnace elements operating in a carburising atmosphere not above 1000°C.

BRIGHTRAY H—a new grade for electric furnace elements operating in the range 1100-1250°C.

WOULD YOU LIKE A HANDBOOK . . .

containing complete data on our electrical resistance materials? We will gladly send without charge on hearing from you on your business notepaper.

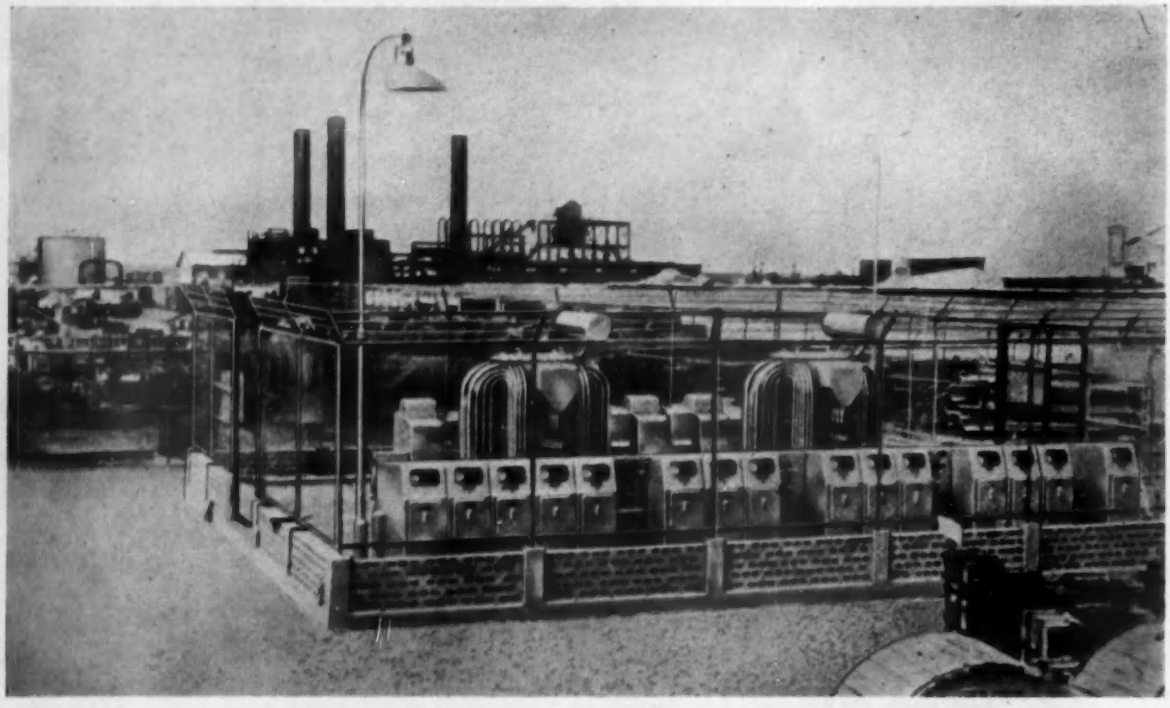
BRIGHTRAY for reliable HEATING ELEMENTS

'Brightray' is a registered trade mark.

HENRY WIGGIN AND COMPANY LIMITED · WIGGIN STREET · BIRMINGHAM · 16

SWITCHGEAR

FOR OUTDOOR USE



Outdoor Transformer Substation in important Oil Refinery incorporating 11kV. 150 MVA. and 440 v. 25 MVA. IVIO Metalclad switchgear units. This illustration is typical of many such installations in various parts of the world.

★

We are acknowledged as the pioneers of outdoor switchgear installations of this character. The quality and performance of IVIO switchgear is the result of over ten years of service experience in the most severe climatic conditions at home and abroad.

YORKSHIRE SWITCHGEAR & ENG. CO. LTD.

LEEDS — LONDON

Associated with ELECTRO MECHANICAL MNFG. CO. LTD., SCARBOROUGH

MK 114 DHB

Important MK Price Reductions

We are pleased to announce that the MK 1956 Catalogue just published features price reductions in two important ranges—13 ampere accessories and Plateswitches. The new prices are the immediate benefit of increased production from our enlarged Park Road factory.

Wages and material costs still show a general tendency to rise. As a counter to this trend our policy has always been one of continually increasing mechanization and simplification. The fruits of long-term planning can now be passed on to the trade in this very positive way. These measures will make a real contribution to lower building costs.

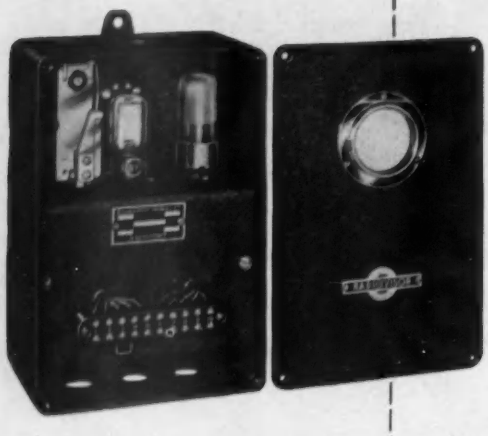
MK 13 ampere accessories and plateswitches are the first choice for most housing schemes. Lower prices will bring an ever wider demand, and we are planning to make greater quantities than ever before.

The 1956 Catalogue is now ready

This 76-page fully illustrated list shows the complete range of MK products including a number of additions. Write for your copy today.

M. K. Electric Limited, Wakefield Street, London, N.18 Edmonton 5151

General Purpose PHOTO-ELECTRIC CONTROL UNIT



The equipment comprises a Control Unit of pressed steel, housing a photo-electric cell and single thermionic valve amplifier. Total consumption of the unit (excluding light source) does not exceed 10 watts, and it is suitable for operation from 200/250 AC supply. Write for full details.

RADIOVISOR
EST. 1927

TYPE 'Q' PHOTO-ELECTRIC RELAY

There are many uses in industry for the Radiovisor Photo-electric relay type 'Q'. In fact, wherever a light beam can be interrupted or varied in intensity, automatic control can be provided and any type of mechanism can be actuated. Operation is accurate and foolproof—it can be instantaneous or delayed for pre-set intervals. The resultant efficiency and economy brought about in industrial operations—many impossible by any other means—is impressive.

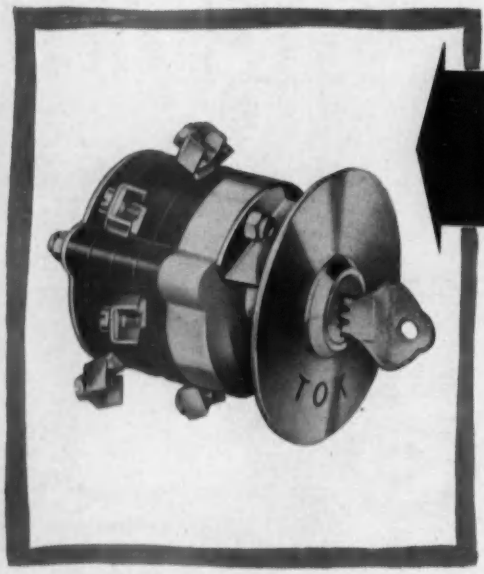
Some of the many uses for the RADIOVISOR 'Q' RELAY

ON-OFF SWITCHING · AUTOMATIC SPRAYING · AUTOMATIC COUNTING
LENGTH CUTTING GAUGE · CONVEYOR CONTROL · PROCESS CONTROL
HEIGHT GAUGE · LIMIT SWITCH · LOOP CONTROL
WARNING DEVICE · PAPER BREAKAGE ALARM

RADIOVISOR PARENT LTD., 1, STANHOPE STREET, LONDON, N.W.1. *Tel: EUSton 5905*

The First Name in Photo-Electric Control

KEY TO A SWITCH PROBLEM . . .



TWO BASIC TYPES ARE AVAILABLE:
Type R.B.10—for ratings not exceeding 5 Amps.
Packet Type for ratings from 5 to 13 Amps at 250 volts.

TOK CYLINDER LOCKED SWITCHES

The Tok "Cylinder-lock" has a variety of applications in industry. It can be used to effectively isolate circuits and equipment, processing plant or machine tools. It is invaluable protection against unauthorised operation.

The "Cylinder-lock" switch can be provided in a number of different locking combinations, or any number of switches may be supplied with keys interchangeable. Alternatively a Master Key principle may be applied. Both basic types are flush mounting.

These switches, and the many other types which comprise the Tok range, may be supplied in quantity from stock; prices will be found competitive.

Tok switches are designed and manufactured to conform to the most stringent standards laid down.

If you have a special switching problem, please let us know.

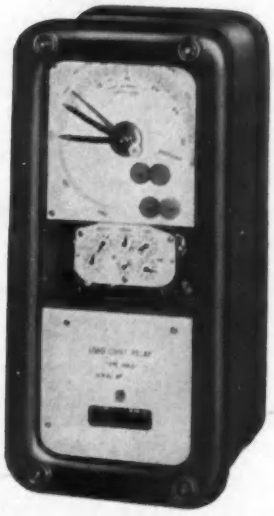
TOK

● *For fuller details write for catalogue No. 19 to*

TOK ELECTRICAL AND INDUSTRIAL MECHANISMS LIMITED

264-270, ST. JOHN STREET, CLERKENWELL, E.C.1. TELEPHONE: CLERKENWELL 2917

Transva kVA Demand Meter (with or without alarm contact).



Types MASA and MASI Relays. For the limitation of kVA demand.

MODERN TARIFFS

require modern methods of LOAD CONTROL

Metrovick equipment for power-factor control and M.D. limitation has been designed by specialist engineers and is fully up-to-date. It can make possible substantial savings in your electricity account.

Please write for descriptive leaflets.

Type NJO4 Relay for the Automatic Control of the Single-stage Capacitors used for power-factor improvement.

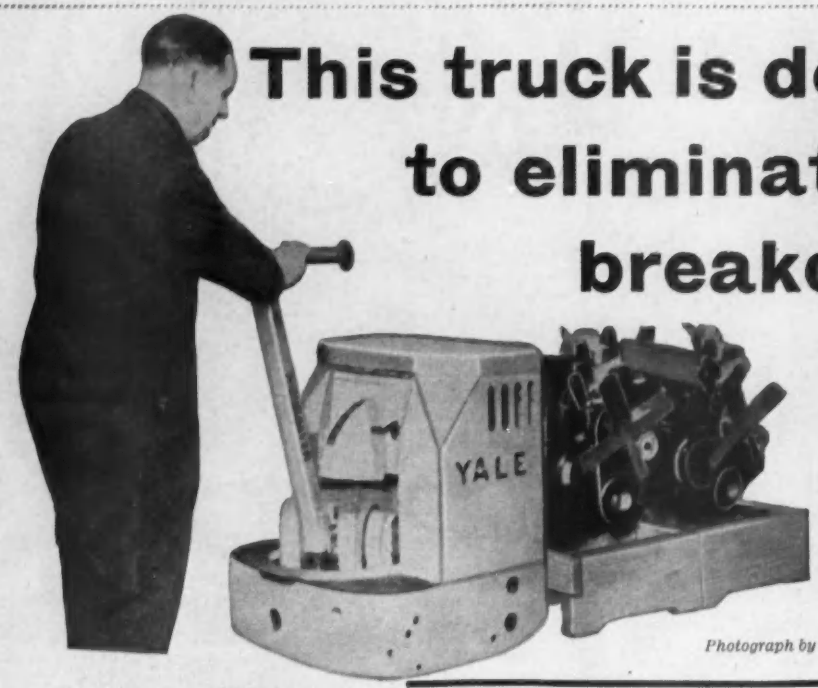
METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

Member of the AEI group of companies

Leading Electrical Progress

G/A 409

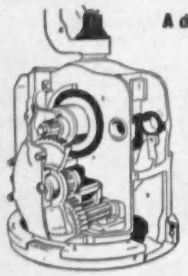
This truck is designed to eliminate breakdowns



Photograph by courtesy of Humber Ltd., Coventry

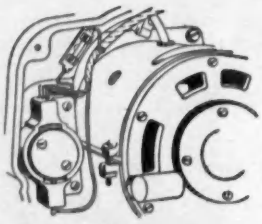
A load on your "Worksaver" is a load off your mind!

When mechanical handling equipment lies idle—waiting for attention or spares—production costs *shoot* up.
Invest in a "Worksaver"; put it to work and compare its trouble-free service with any of your other trucks. Then you'll understand why so many plants—large and small—are changing to Yale.
The "Worksaver" is available in Fork Lift, Pallet, Platform and Tractor models.



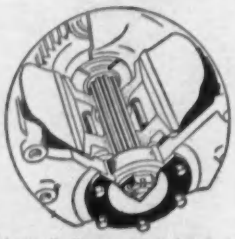
A drive unit that lasts a lifetime

This powerful, robust drive unit will stand up to a lifetime of rough handling. Gears are drop-forged nickel-chrome-molybdenum steel, heat-treated and mounted on ball bearings, operating in oil. Entire drive unit is enclosed and floats on 105 ball bearings.



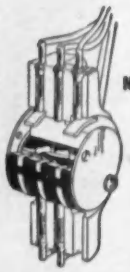
Simple to change brushes

Drive motor of a high torque series wound type, specially designed for easy cleaning and adjustment.



Split hub eliminates pressing in tyres

Worn-out tyres can be quickly replaced by using hand tools—an exclusive Yale feature.



No frayed, broken wires

On the "Worksaver", all flexing, chafing and bending of wires is eliminated. Slip rings are built into the base of the handle so that wiring cannot be twisted or bent, no matter how the handle is turned or lifted.

A capstan built to take the load and more

The load-carrying tapered roller bearing ensures perfect alignment of the unit. The power line is carried through silver contacts. Wires cannot bend whatever the angle of the turn.

Fully protected—easily accessible

The head and heart of the "Worksaver" is fully protected, yet easily accessible for adjustments and inspection. It can be removed from the truck in five minutes.

Finger-Tip control

Large man-size handles with finger-tip cam controls. Ends carry guards for safety. Two speeds forward and two reverse. Lift control and horn button in easy finger-reach position.

YALE

REGISTERED TRADE MARK

RELIABLE MATERIALS HANDLING EQUIPMENT

YALE & TOWNE makes the world's largest, most comprehensive range of materials handling equipment—including 1,000 lb. to 100,000 capacity power trucks.

Write for full details to: THE YALE & TOWNE MFG. CO. Materials Handling Division, Dept N.10, WEDNESFIELD, STAFFS., ENGLAND. Telephone: WILLENHALL 630

ELEVEN NEW SOCKET-OUTLETS FOR THE COMPETITIVE INSTALLATION

"Outstanding from any Angle"

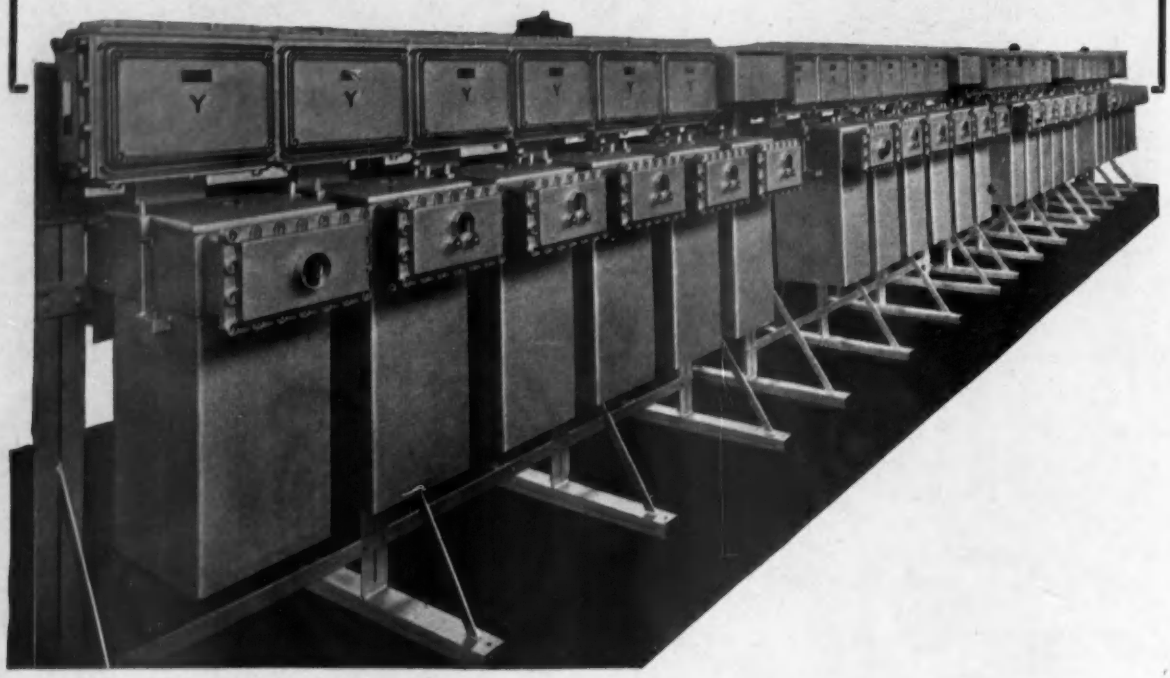
You will be impressed with the shielding mechanism of Crabtree 13 amp. socket-outlets because it is so simple and reliable. A flat fibre shield is operated through a cam by the earth pin of the plug. The cam is of nylon material—it therefore moves with a minimum of friction and requires no lubrication. As the plug pins do not come in contact with the shield, this again is not subject to wear or abrasion and will last indefinitely. Like the other features of this versatile new socket-outlet, the shielding mechanism is outstandingly different. Full details of the range of surface and flush, shockproof and metal patterns will be found in Crabtree Publication No. T167.

CRABTREE

WIRING ACCESSORIES • SWITCHGEAR • MOTOR STARTERS

"Crabtree" (Registered) *C.730/42 Advt. of J. A. Crabtree & Co. Ltd., Lincoln Works, Walsall, Staffs.*

OIL IMMERSED (OUTDOOR TYPE) CONTACTOR STARTERS



The illustration is of four of sixteen outdoor weatherproof Switchboards for floating platform duty on Lake Maracaibo, Venezuela, consisting of Oil Immersed Starters, auxiliary transformer and flameproof control compartments, pumping oil and maintaining tank levels. Designed to withstand semi-hazardous conditions, salt spray and oil.

We are acknowledged as pioneers of outdoor Switchgear installations, the quality and performance is the result of over ten years of service experience in the most severe climatic conditions at home and abroad.

ELECTRO MECHANICAL MNFG. CO. LTD.

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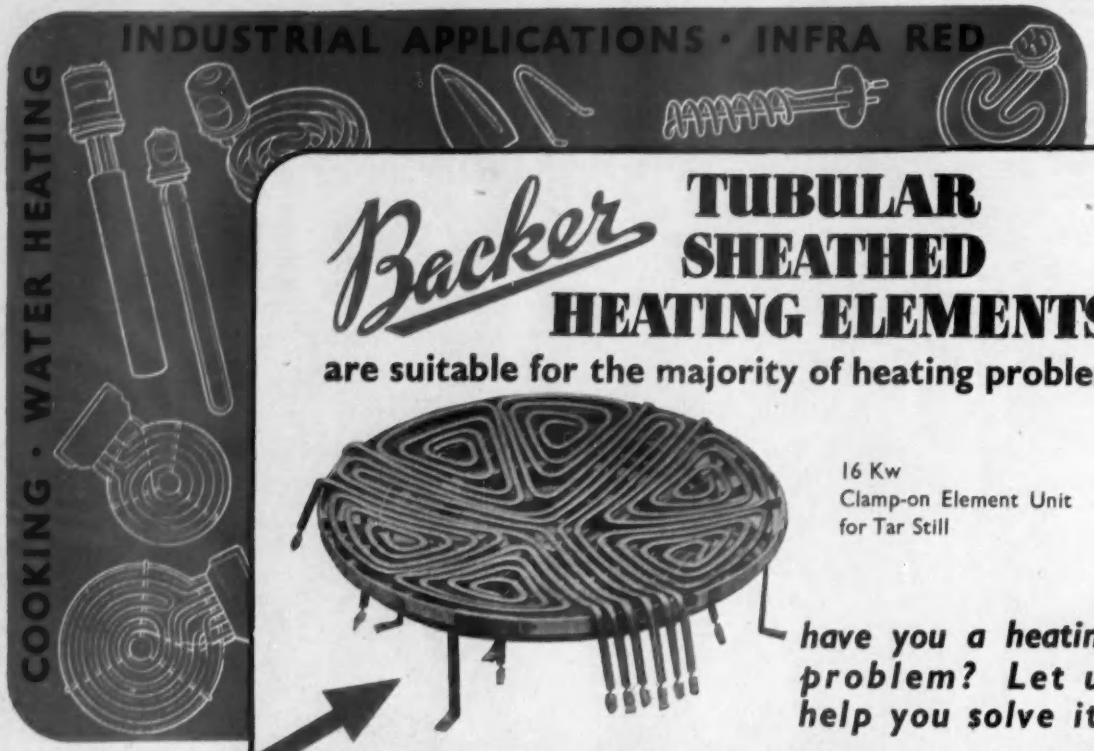

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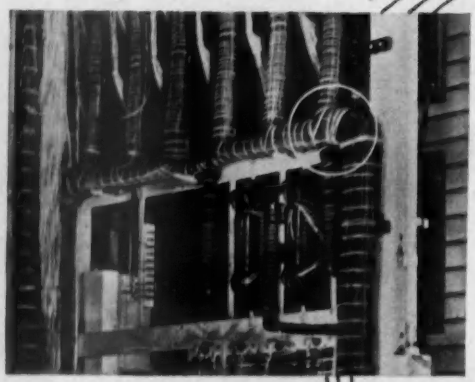

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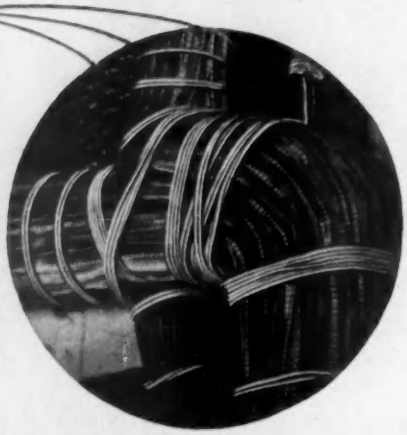
has more than proved equal to the job.



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ALUMINIUM CONDUCTORS

In pioneering the use of Aluminium Conductor power cables, Glovers have developed a unique jointing technique. The method provides a perfect joint which satisfies all operating conditions.
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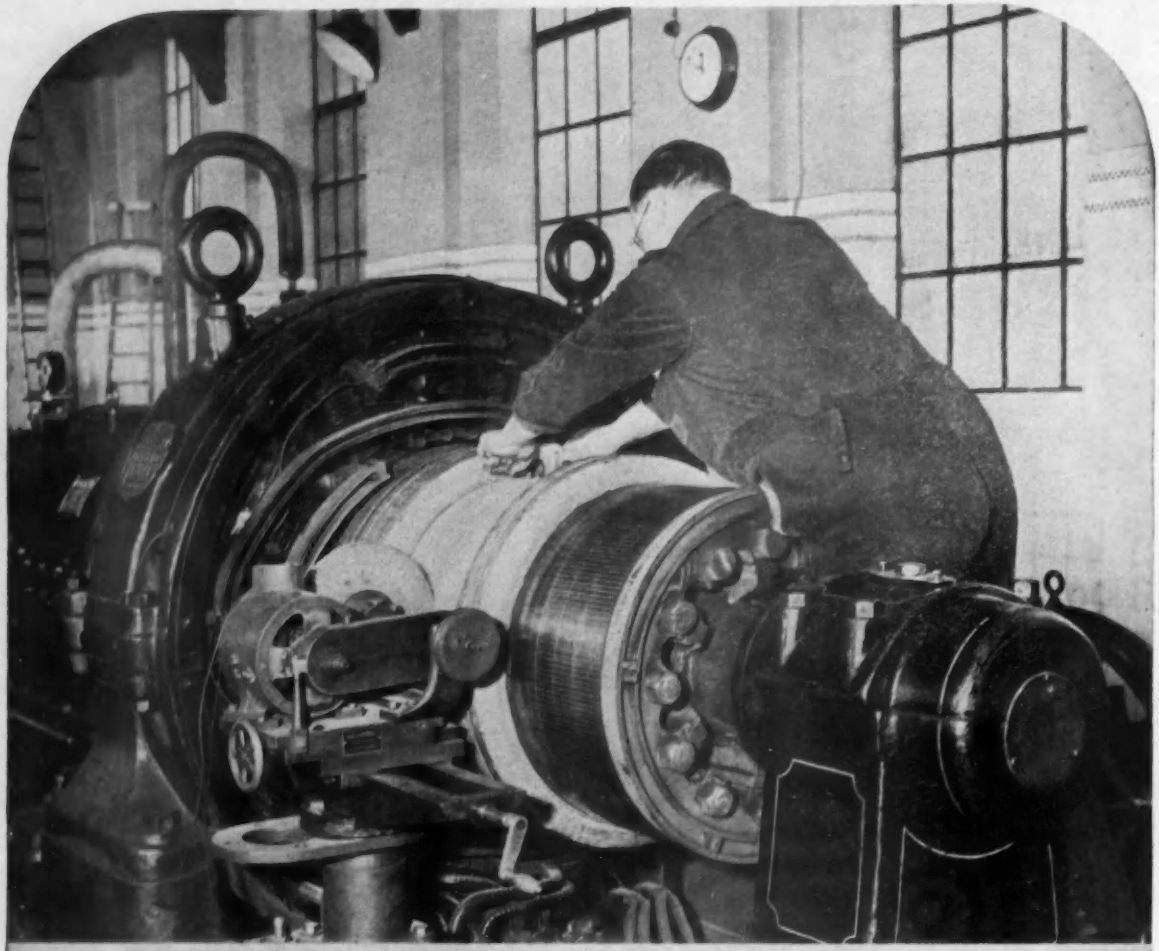

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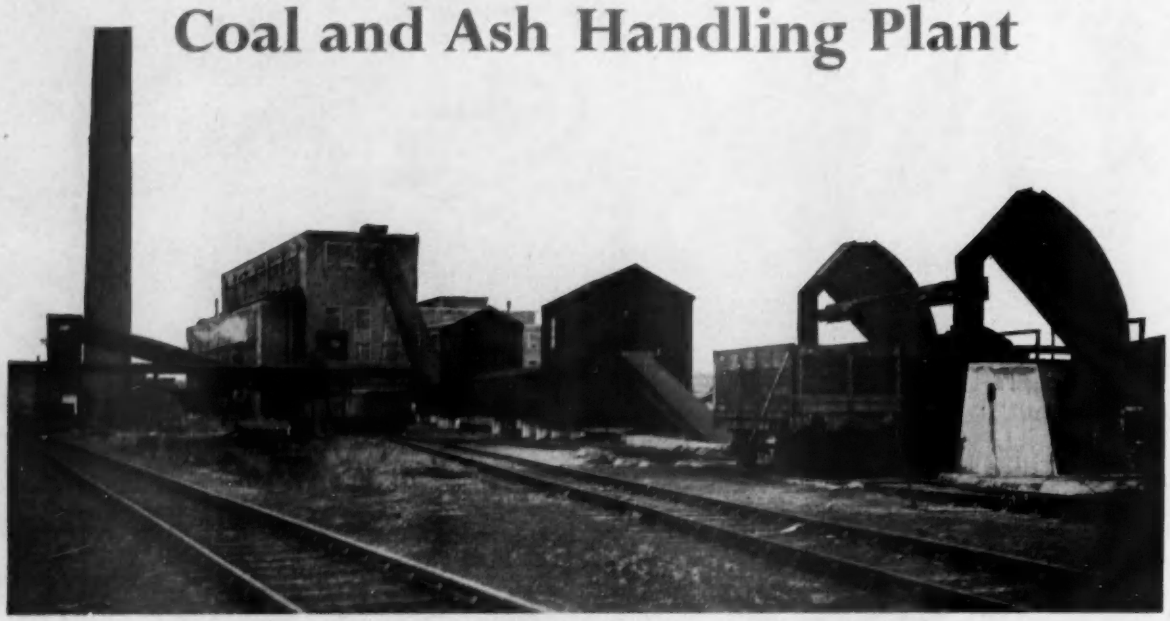
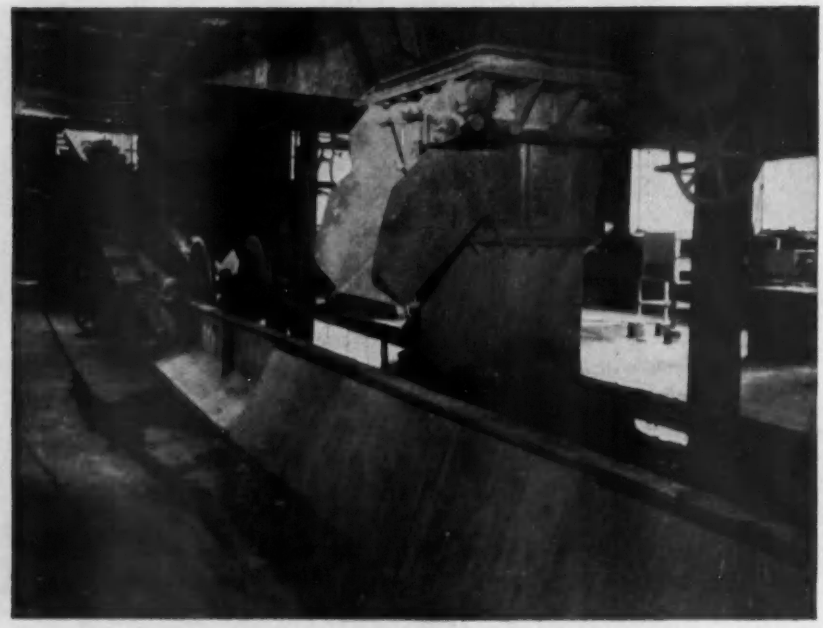
JOHN THOMPSON
Coal and Ash Handling Plant



Showing the Wagon Tippler, Weighbridge and Main Conveyor rising to power station.

at John Summers & Sons Ltd.

The conveyor system handling coal and coke for the boiler plant at Shotton will at first deal with approximately 650 tons per month, but has been designed to carry greater quantities when extensions are fully developed. Incoming fuel is unloaded by wagon tippler and transferred to the main belt conveyor which incorporates a recording weighbridge, and then rises 80 ft. to the distributing conveyor where a travelling tripper discharges the fuel into the appropriate bunkers. Spent ash is discharged from the boilers to the John Thompson Patent Submerged Ash Conveyor, and is raised by a further conveyor to the ash bunker.



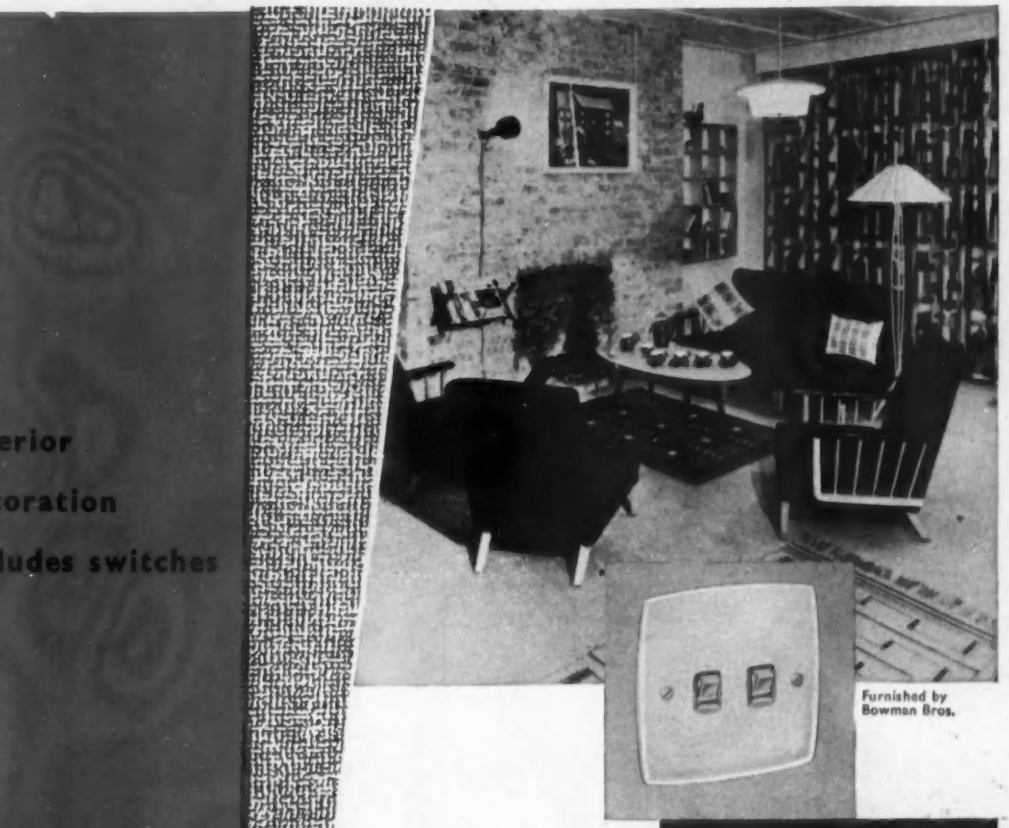
Submerged Ash Conveyor — the belt runs in water, minimising power consumption and maintenance costs

JOHN THOMPSON CONVEYOR COMPANY
WOLVERHAMPTON

JOHN THOMPSON CONVEYOR COMPANY — JOHN THOMPSON GROUP

ITC/101

interior
decoration
includes switches



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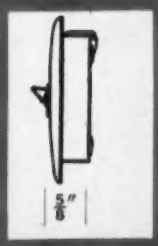
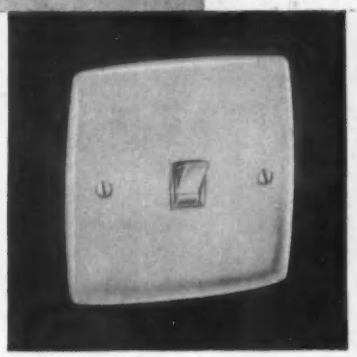


1 and 2-gang plate & switch assemblies. 2¾" fixing centres to BS.1299. For use with plaster-depth or deep boxes of wood or steel. Automatic levelling with plaster is ensured

Rooms like this—modern rooms demand modern switches
And what could be more attractive—more efficient—than Simplex plate and switch assemblies. These competitively priced units win on all counts. They are silent in operation, yet have positive action; quality built; superbly styled Designed to simplify wiring and installation problems. Complete range of switches covering every variation of control, including intermediate switch
1, 2 and 3-gang units in brown or ivory



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by **Simplex**

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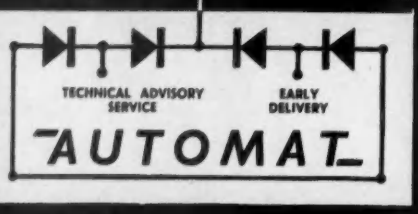

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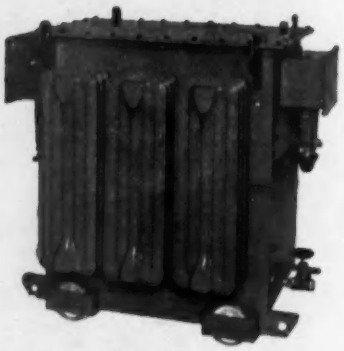

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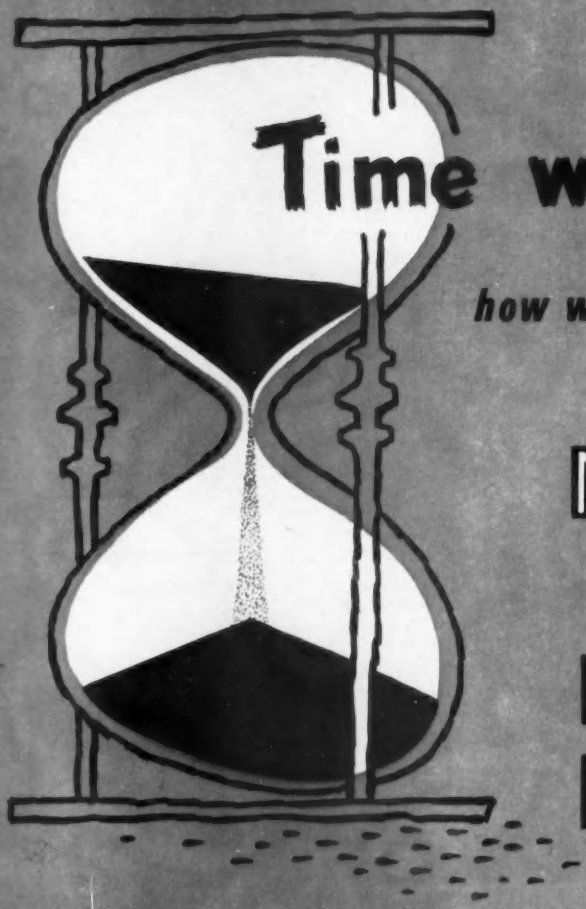

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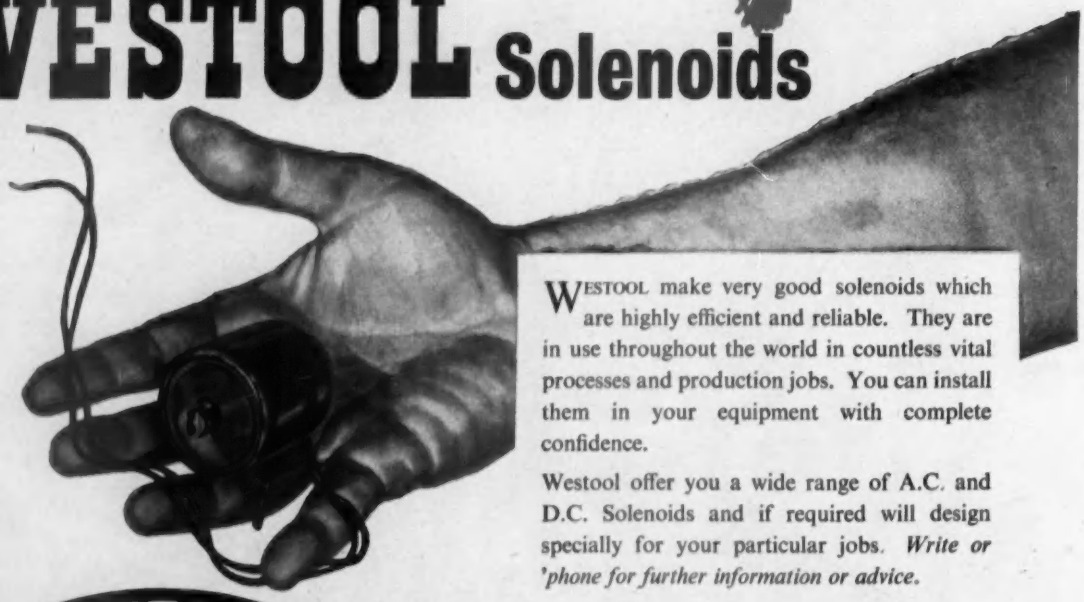

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TIE 224

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The main erection bay with special impulse testing station in foreground.

The Ferranti transformer factory at Hollinwood covering an area of over 300,000 sq. ft. has a manufacturing capacity per annum of over 5,000,000 kVA of Large Power Transformers, Distribution Transformers, Voltage Regulators, High Voltage A.C., D.C., and Impulse Testing Plant and Specialised Equipment.

A view of the Ferranti Transformer Factory at Hollinwood.

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IMPROVED AND RE-DESIGNED— many new features!

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5. Nylon shutter.
6. Shutter spring.
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8. Silver - plated heavy duty fuse retaining clips.

ALL THIS COMPLETE FOR 7/- each (LIST)

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PRICES	Ref.	doz.
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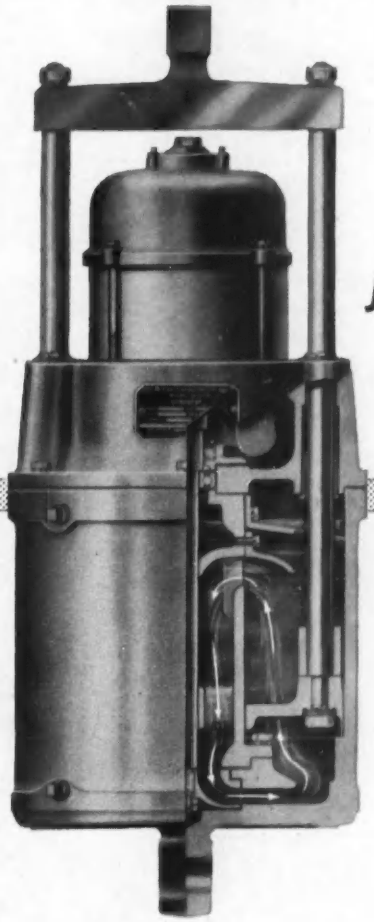
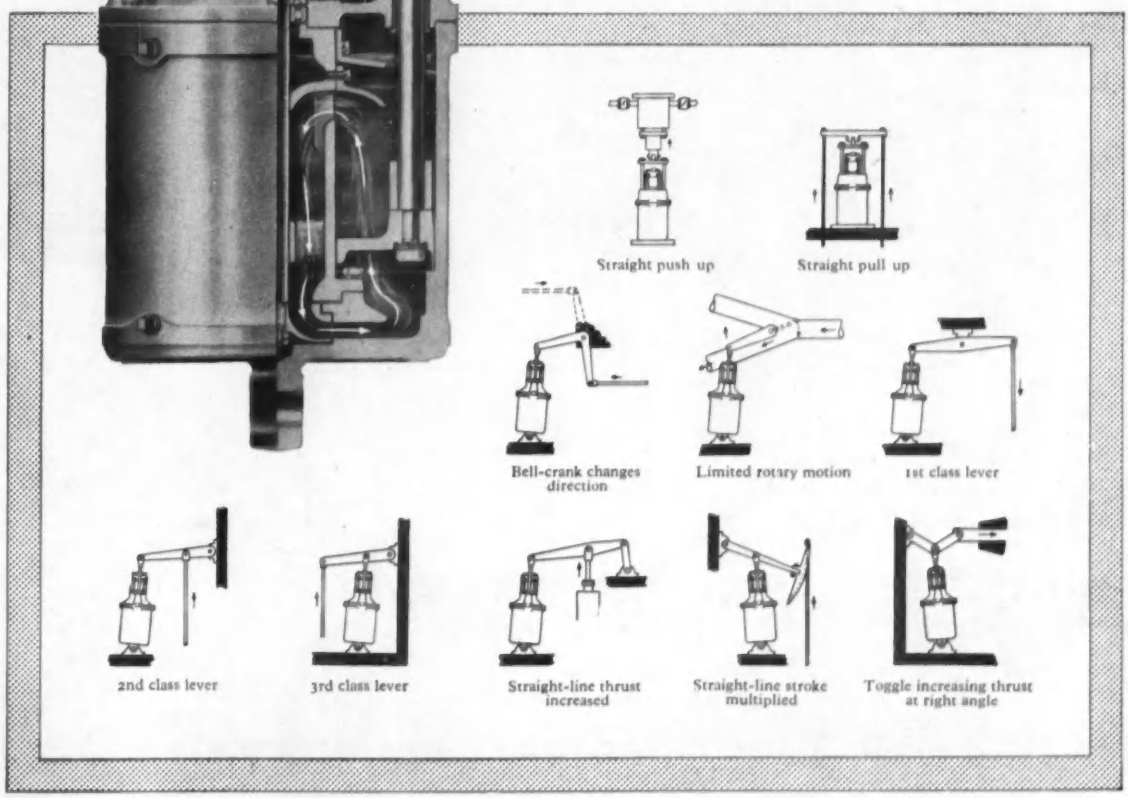
Electro-Hydraulic Thrustors



Smooth straight-line constant-pressure thrust from start to finish of stroke.
From 40-lb. thrust, 2-in. stroke to 800-lb. thrust, 12-in. stroke.

Just switch on—

the thrustor does the work



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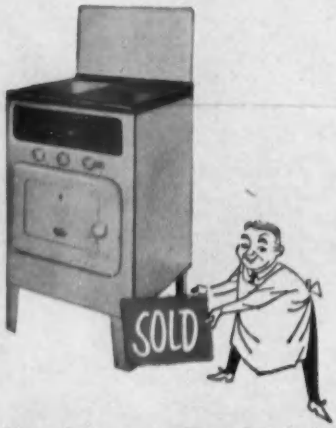
You get a QUICK RETURN with this new CARRON trio

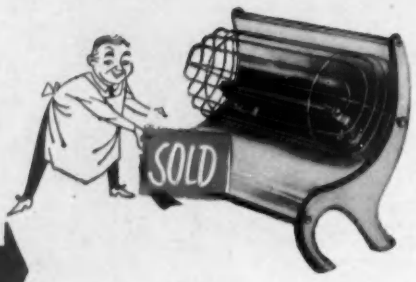
"L3" Three Plate Electric Cooker

A compact modern cooker with thermostatically controlled oven, grill-boiler and two solid hot-plates. The oven is fitted with a single plug-in element of special finned sheath type*—positioned at the bottom of the oven under a removable base pad. Cooking capacity: 2,656 cu. in. Grill chamber supplied with deflector plate and adjustable grill pan and grid. Cooker is constructed in cast iron and mild steel for durability and easy cleaning. Hob is hinged. Total loading 7,200 watts. Cooks for 8 people. *(*patent applied for)*



A similar cooker in the " L" series, but designed to cook for 4-6 people is the " L.2 ". This is identical with " L.3." in design and size, except that it has one solid hot-plate instead of two. Total Loading 6,200 watts.

"L2" Two Plate Electric Cooker



An entirely new radiant electric fire attractively designed to harmonise with contemporary or traditional furnishings. The " Curtsey " is strong and robust yet light in weight and transportable. Fitted with heavily plated fixed reflector, and efficient safety guard. Available in a range of 5 lovely CARRONTINE finishes. Loading 1 kW or 2 kW.

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'Superform' switchboards

for the control of MEDIUM VOLTAGE circuits

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FUSE-SWITCHES

in ratings up to

750 amps.

The new 'Superform' switchboard installed at one of the factories of Fisher and Ludlow's Material Handling Division, to deal with the heavy electrical demands of their new FLOWFORGE welding plant.

MODERN STYLING
Easy to clean smooth flush contour. Retractable switch operating handles.

SAFETY FEATURES
Busbars, connections and terminals fully insulated. Potential circuits fused at supply point. Integral cylinder locks fitted to fuse-switches.

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Fuse-switches proved for making capacity on 50 MVA. at 440 volts, 3-phase, 50 cycles.

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Hinged instrument panels give ready access to instruments, terminal boards and small wiring.

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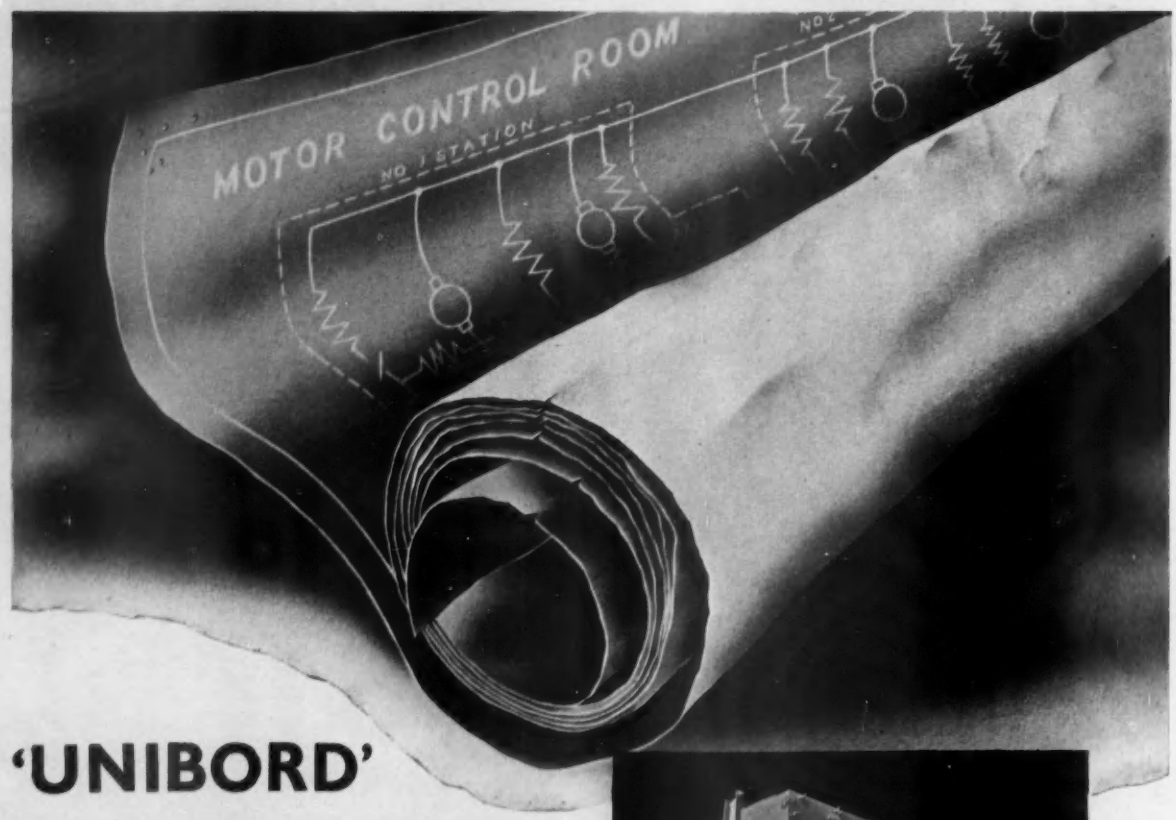
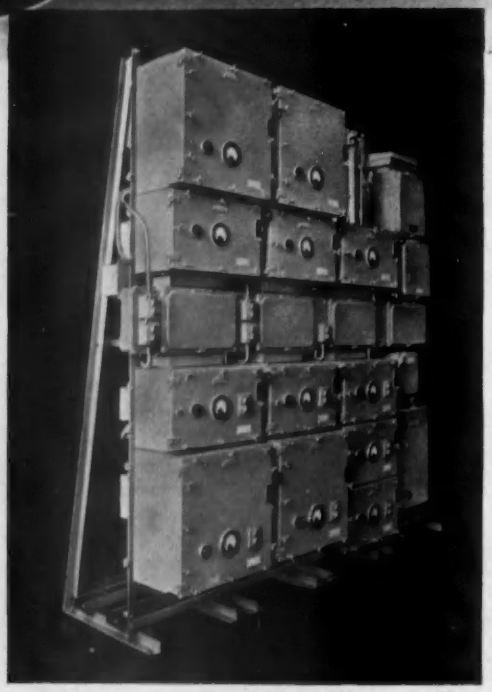


'UNIBORD' *construction saves time and money*

The adjacent illustration will convey much to the discerning engineer. It shows the space-saving compactness of 'Unibord' construction and how readily erection, re-siting and extension can be carried out. What the illustration does not show is the in-built dependability of every unit in the Brookhirst standard range—the result of more than 40 years' experience in the design of high quality motor control gear.

Further details of 'Unibord' Motor Control Equipment are contained in Publication 631 A. *May we send you a copy?*



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BROOKHIRST SWITCHGEAR LTD NORTHGATE WORKS CHESTER

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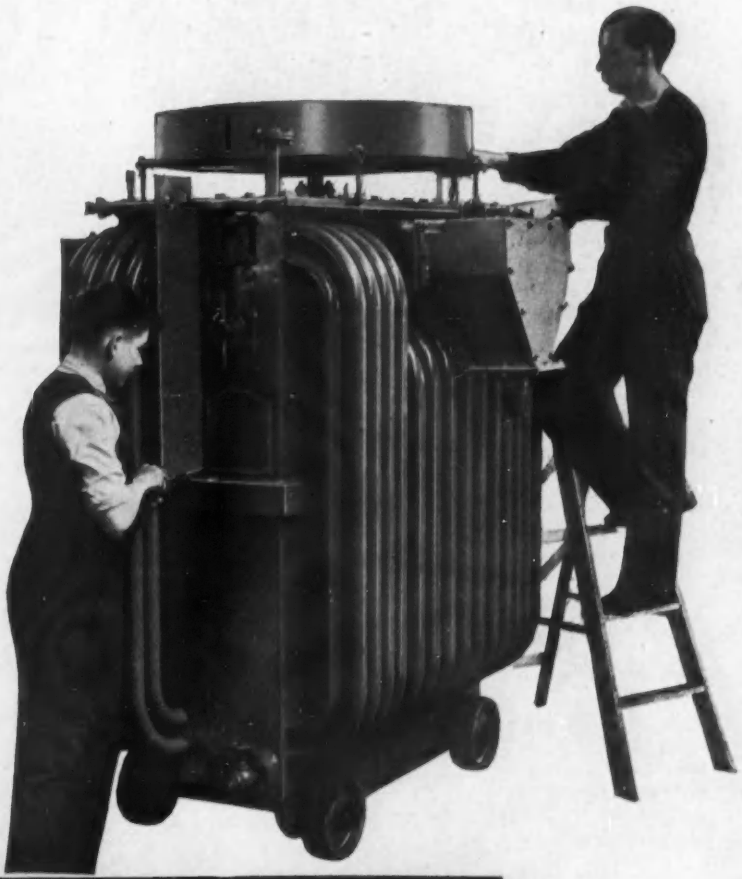
HERMETICALLY SEALED TRANSFORMERS

All our Hermetically sealed Transformers are guaranteed against moisture absorption and oil acidity for 10 years.
All service engineers will realise that the capitalisation of their service charges for oil testing and filtration will more than outweigh the initial small extra cost.



This is a hermetically sealed 500 kVA 3 phase outdoor type transformer.

THE LINDLEY THOMPSON TRANSFORMER & SERVICE CO. LTD

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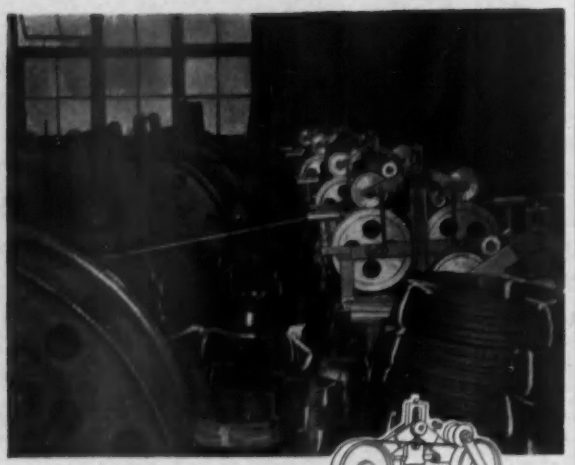

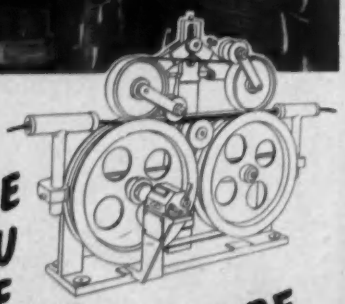

THIS MACHINE CAN SAVE YOU UP TO 1% OF YOUR TURNOVER IN CABLE MANUFACTURE

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For consistent accuracy experienced users install the Barnaby Cable Measurer, made in two sizes up to 1 in. and 2½ in.

This equipment is far in advance of previous methods and can save its cost in a few weeks.

Slip is reduced to an absolute minimum, cable drag eliminated and the equipment is capable of consistent measurement within the limit of plus or minus one quarter of one per cent at high operating speed.

These features mean **accurate** *readings*

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NEGLIGIBLE SLIP is guaranteed by the pivoted top belt.

SUBSTANTIAL GUIDES ensure even run of cable. The guides are quickly interchangeable for different sizes up to 1 in. or 2½ in.

EASY RUNNING through light alloy wheels and ball bearing mounting. Minimum drag on cable.

SPECIAL COUNTER measuring to 3 in. increments.

SELF-ADJUSTING.

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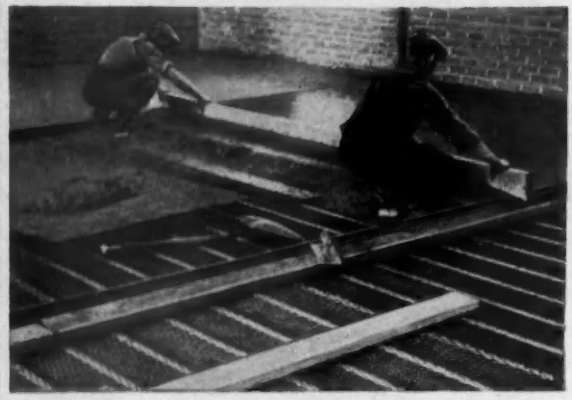
"Panelec" CUTS HEATING COSTS

Panelec Embedded Electric Low Temperature Floor Warming guarantees an atmosphere of comfort and warmth in any type of building, irrespective of external conditions—at a cost which is always comparable with, and often less than any available alternative form of heating.



Architects! *Panelec Low Temperature Radiant Warming System reduces building costs. It requires no boiler room, saves fuel storage space and eliminates pipework and radiators — simplifies the job of design too.*

Electrical Contractors! You *can install Panelec quickly and easily in old or new buildings. It is foolproof in operation, thermostatically controlled and needs no attention.*

Users! *With low initial cost and low operating cost* Panelec is fully automatic, totally concealed, causes no discolouration of furnishings or decorations, is silent and completely safe.*

Panelec is clean, safe, healthy and automatic — why not investigate its possibilities more fully? Write for Publication No. PAN. 655 D or discuss the matter with Panelec Technical Advisory Service. Our Engineers will be pleased to help and advise you.

* *Panelec is designed to take advantage of OFF-PEAK tariffs.*

"Panelec"
REGISTERED TRADE MARK

N.B. "Panelec" is the original, registered trade name for this patented warming system, which can only be obtained from the address shown here.

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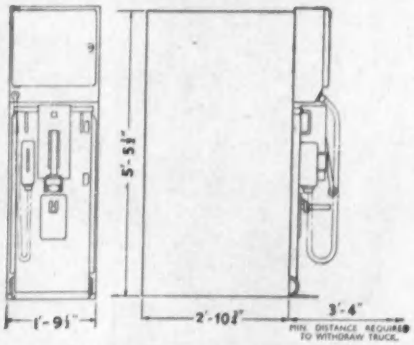
Telephone: REDHILL 3461 (5 lines) PBX. Telegrams: MURELEC. REDHILL.

Putting it in its place

There's a time and place for everything, including SWITCHGEAR installations. Maybe the time is NOW—perhaps the need is for 11 kV SWITCHGEAR. The place—a new substation or extension to existing equipment ? To install ' BV ' Switchgear in a substation is a supremely good example of putting " the right thing in the right place." And—by the way—every unit is self-contained and fully interlocked.

SMALL SPACE REQUIREMENTS



'BV' Switchgear is giving satisfactory service in many parts of the world. A typical switchboard is shown here.

Particular attention has been paid in the design of 'BV' Switchgear to the importance of minimum space requirements.
For its capacity ***the dimensions shown are significant.***

'BV' Switchgear is dependable

Ferguson Pailin LIMITED *for Switchgear*

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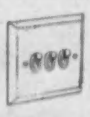
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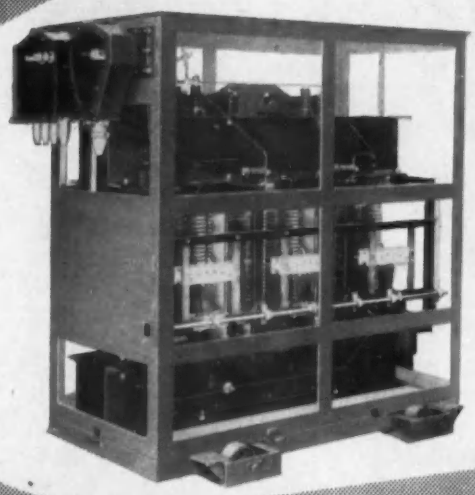

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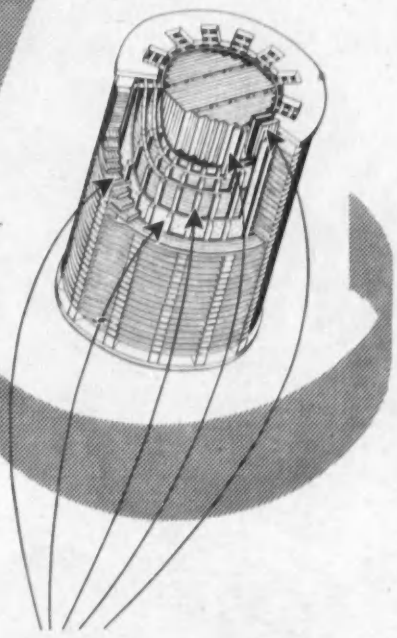

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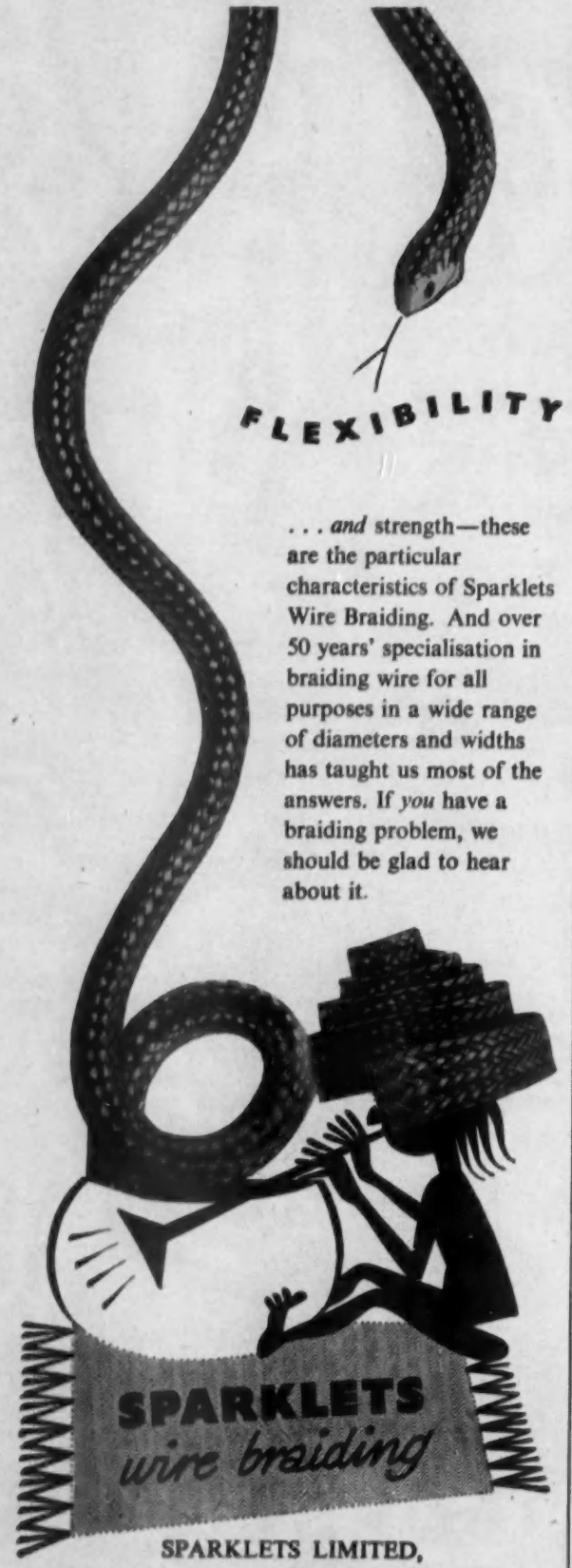

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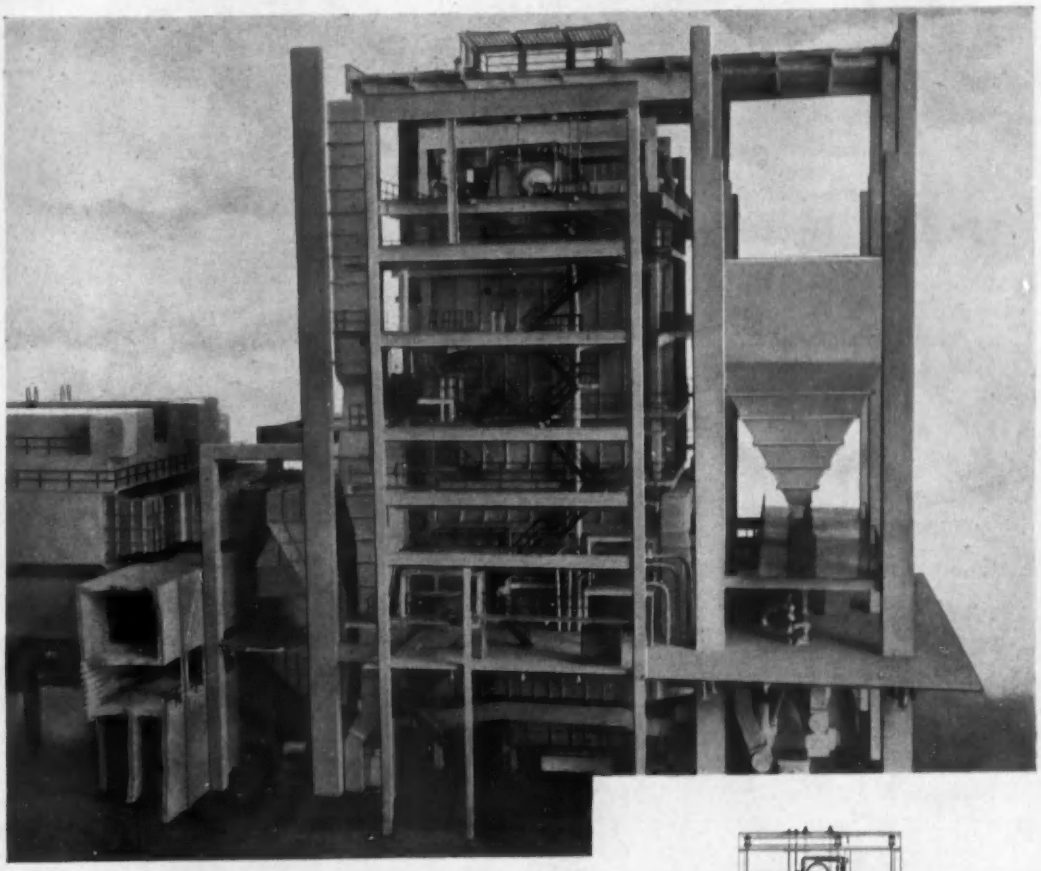

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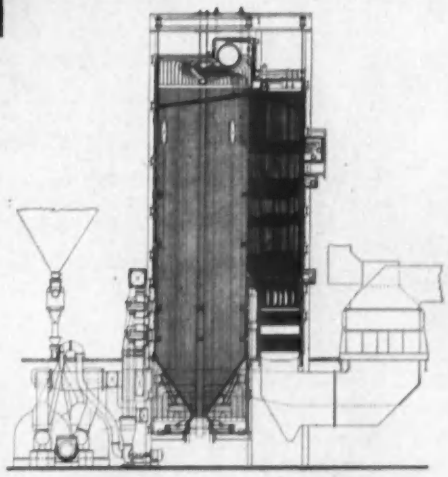

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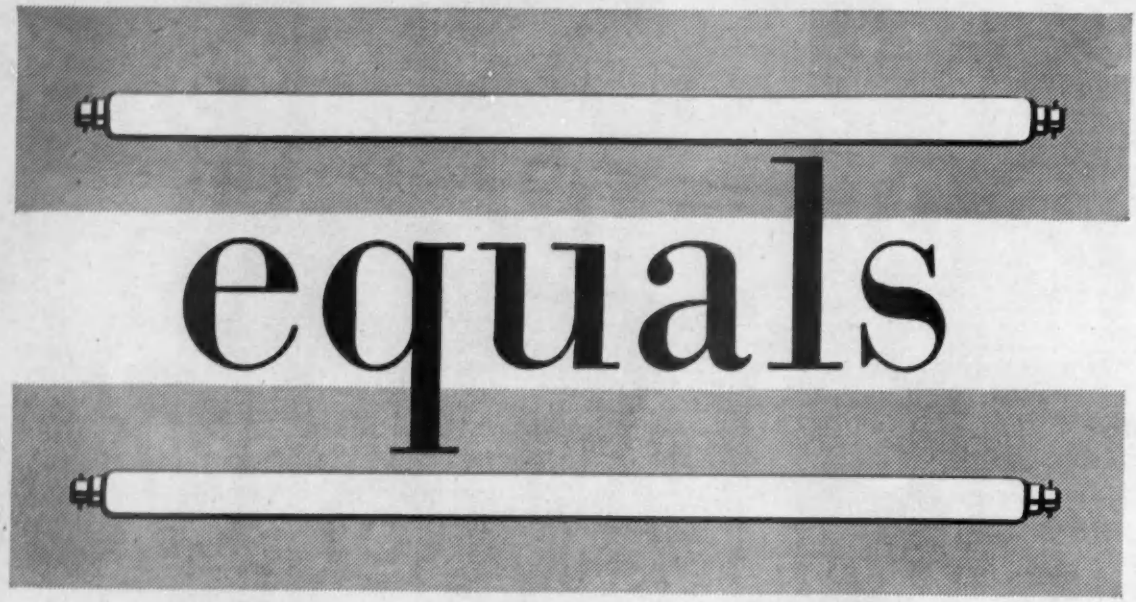

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ELECTRICAL TIMES

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ATTENTION FOR TRACTION

Despite their many qualities, trolleybuses and tramcars are out of favour with public transport authorities at present. Reports from time to time of disputes in local councils about a change over to diesel-engined vehicles is a continuing sign of this fall from favour. More conclusive are the figures for sales of electricity for electric street traction. They show that since 1947, there has been a drop of nearly one-third in such sales—during a period in which all other uses of electricity have expanded sharply. The time is approaching when some of this ground should be regained. Air pollution will be a lively topic during the coming months, and the Beaver Committee has underlined the troubles that can arise from diesel-engine exhausts in areas of heavy traffic congestion when the movement of air is restricted. Councils which are facing expenditure on smoke inspection services and smoke control zones are likely to be receptive of information on the advantages of relatively clean methods of transport. The present is thus a favourable time for propaganda effort in this field. In this direction, the organisation by B.E.A.M.A. of special courses for employees of transport departments is welcome. At present, the courses are designed for the technical employee, and the standard of candidates is widely varied. Something on the same lines for transport department executives might pay off even better. In either case, there will be the advantage of men informed of the latest improvements and techniques in the manufacture of electric road traction equipment, going back to an everyday task better equipped to argue effectively the undoubted advantages of the trolleybus and the tram.

MORE ACCURACY FOR INSTRUMENTS

Control and instrumentation are inextricably linked together in the concept of "automation," and the rapid developments taking place in this particular field are beginning to present the instrument designer with demands for accuracy which have not hitherto been required in industrial work. Where continuous processes are concerned, automatic control offers the prize of greater consistency of output with increased production, but attainment of this reward is dependent on the accuracy and speed of response of the system which has to detect and rectify any deviation from the normal. In his Chairman's Address to the I.E.E. Measurement Section, Mr W. Bamford, commenting on this subject, suggested that the electrical instrument manufacturer might have to think in

terms different from those in B.S. 89, when considering electrical movements for control of automatic processes. The requirements are well known; reliability, ruggedness, accuracy, and specific speed response are all targets which have been in the forefront of electrical instrument design since the beginning of electrical measurement. Now acceptable limits must be notched up to a closer specification and the need for instruments with standardised dimensions, capable of being "plugged-in" to control systems is on the horizon. How these requirements are to be attained it is not easy to visualise. The suggestion was made in the address that more attention might be paid to the mechanical side of instrument design, and here there may well be room for some improvement. From the electrical aspect, the potentialities of developing even higher standards of accuracy using existing techniques are limited.

TECHNIQUES OVERHEAD

Subject for one of our main articles this week is a technique for improving supply continuity on overhead distribution circuits. This application of flexible cables and pre-formed joints is a simple though effective advance in distribution practice, and the reason for mentioning it here is that it provides yet another sign of the increasing attention being given to the operating side of rural systems. There have been many instances of this in the past year or so, notable examples being the intensified interest in automatic reclosing circuit-breakers and the development of tools and techniques for working on energised circuits. The picture that is built up by these isolated developments is one of a new awakening in a branch of electricity supply practice hitherto rather neglected in this country. The problem in the past has certainly been less urgent than in countries where the great majority of distribution circuits were overhead, for in Britain such circuits usually supplied isolated premises so that outages had a limited effect. Since the war the remarkable development in rural electrification and the decentralisation in industrial building that has been achieved has brought about the changed situation which is now evidently receiving much thought, with the result that the gap between o.h. line practice here and overseas is closing.

INTERNATIONAL POWER SCHEME

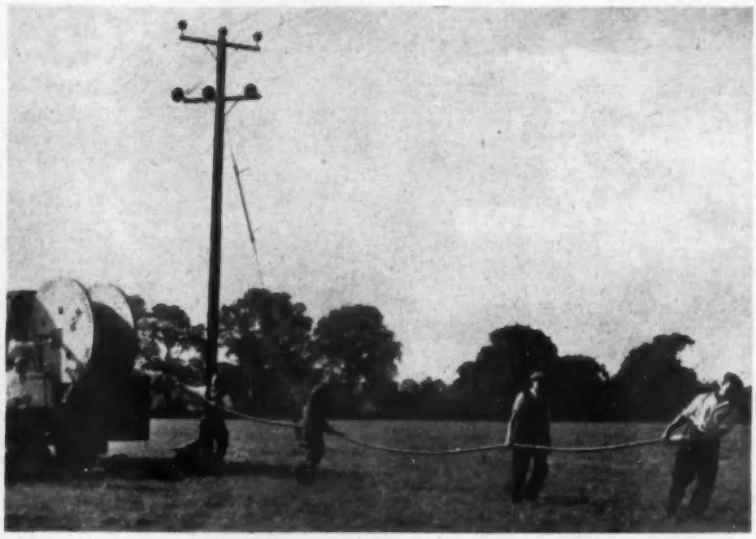
With a potential installed capacity of 1,640 MW, the joint U.S.-Canadian St. Lawrence power project must rank among the largest low-head hydro-stations yet conceived. According to the latest Annual Report available from Ontario Hydro, many novel features will be incorporated in this imaginative international enterprise for harnessing the waters of the St. Lawrence River. The scheme envisages two power houses forming an integral part of the 3,250 ft long gravity dam, and each of them will have an installation of sixteen 75,000 h.p. water turbines. For the first time in Canada, a form of semi-outdoor construction has been selected for a hydro-electric scheme. The roof of each of the stations will be made with removable sections and heavy lifts will be carried out by the use of cranes which can travel along the dam superstructure. At both the American and Canadian ends of the dam, a full height building is to be erected into which the cranes can travel, and where erection and maintenance can be carried out. Already work is in hand on this scheme which is tentatively scheduled for service between 1958 and 1960. Construction is proceeding simultaneously from both American and Canadian shores, towards the International Boundary which will bisect the dam and divide the two power houses. The Canadians have aptly christened their part of the work the Robert H. Saunders – St. Lawrence generating station; a fitting tribute to the man whose untimely death prevented his seeing the accomplishment of a scheme for which he fought so long.

RAIL RECORD

Most major engineering developments today are subsidised in some way by Government Departments or other potential users, so a "world's most powerful" owing its existence only to the enterprise of the manufacturer concerned is worthy of special attention. We have in mind the new diesel-electric locomotive we were privileged to inspect this week, which can claim to be the most powerful example of diesel rail traction yet constructed in a single unit. The key to this distinction lies in the high power – weight ratio which the manufacturers, English Electric, have achieved with their use of the novel Deltic engine. The full worth of the new locomotive will obviously not be known until it has completed the trials it is to undergo over British Railway lines, but the estimates made by its designers promise well for the future of the unit as a leading contribution to the modernisation of British Railways so far as the sections of the lines that are not yet to be fully electrified are concerned.

BRITAIN'S GEOTHERMAL POWER

In any detailed estimate of the world's energy resources, after the main fuels have received attention, there occurs a miscellaneous section to take account of wind and tidal power and the like. Here there is to be found some estimate of the contribution that geothermal energy can make through the utilisation of such phenomena as the trapped volcanic steam at Lardarello in Italy and the hot geysers of New Zealand. Now there seems a chance that Great Britain may have a contribution to offer in the smallest way. At Bath, water at 110° F continues to flow from the mineral springs at a rate of about five hundred thousand gallons a day, just as it did when Aquae Sullis was a delight to the Romans as a social centre and medical Mecca. The availability and present waste of so much heat has attracted the attention of that indefatigable enthusiast for the heat pump, Mr G. O. McLean, of the South Western E.B., who sees an opportunity of a five-to-one energy advantage by this method over direct electrical heating. A possible customer exists as well, in the new municipal buildings that are planned for Bath. And is the North Western Board to be left behind? Though Buxton never attained the Roman splendour of Bath, it can again offer hot water in considerable amounts. Utilisation of these two underground energy sources will never solve Britain's fuel problem, but it would, if successfully achieved, provide a newsworthy demonstration of heat pump possibilities.



E. A. CULLEN,* M.I.E.E.
describes the use of flexible cables for temporary 11 kV connections

Maintaining Supplies in Rural Areas

A BRIEF description of experiments carried out by Mr L. F. Wier of the Cornwall Sub-Area, South Western Electricity Board to preserve the continuity of supplies in rural areas during essential maintenance periods, appeared in the ELECTRICAL TIMES of 28th July, 1955. Similar investigations have from time to time been made in other rural areas where the fault incidence has been high, and where overall development and expansion have been on such a scale that normal preventive maintenance has been difficult to carry out without prolonged interruptions of supply. The present article describes a technique developed for use by the Eastern Electricity Board.

In rural Essex the problem of maintaining supplies has been of exceptional concern because of the extended nature and light construction of the 11 kV network, originally designed for supplying numerous isolated premises and temporary weekend dwellings which became congested built-up areas because of the impact of World War II and its aftermath. Spurs and distribution lines became densely loaded feeder sections almost overnight. The migration of industry into rural areas added to the difficulty and made the quickest possible restoration of supply after an emergency essential. Experience indicated that the longer interruptions generally arose through the breakdown of underground cable sections. In the period between the wars many sections of "rural" 11 kV cable were interposed in overhead lines and it has proved that although cheap in the first cost. this type of cable suffers from ageing propensities and is prone to damage from lightning and mechanical causes. This, therefore, became the main matter for concern and the problem centred around the means of making a quick restoration of adequate supplies of electricity interrupted by the breakdown of cable.

During the investigation which followed it became evident that if suitable means could be found to provide for the condition referred to, its applications were numerous especially having regard to the need for carrying out adequate preventive maintenance on plant associated with extended heavily loaded rural lines.

**Mr Cullen is Sub-Area Engineer, Essex Sub-Area, Eastern Electricity Board.*

Flexible Cable

The cable required for inserting on a temporary basis of this kind to allow repairs or maintenance works to be carried out needs to be flexible in length and make-up, robust, light in weight and easy to handle. Its mode of connection must be reasonably simple and uncomplicated by sweated jointing or compounding, above all it must be safe to handle in the temporary location it occupies. As the extremities of the cable would invariably be connected to overhead wires, special precautions were visualised as being necessary to protect the crutch of the cable and also to ensure that suitable core insulation was applied. The method which has been found most satisfactory is one in which the three cable cores are brought through the sleeves of a specially moulded rubber cap and taped with adhesive p.v.c. tape.

The ability to supply an a.c. load of approximately 1,000 kW was a salient feature to be taken care of, and finally decided the size of core to be used in the cable.

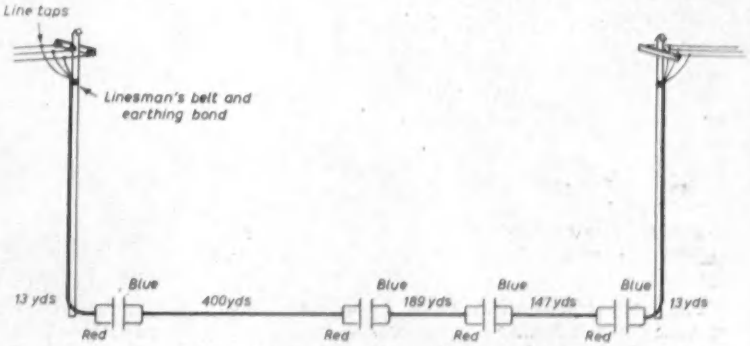
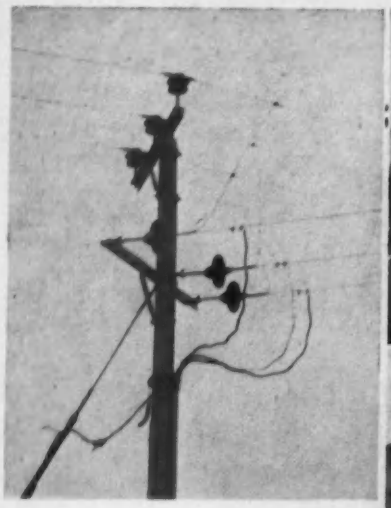


Fig. 1. This diagram shows cable lengths available, and arrangements for jointing and fixing



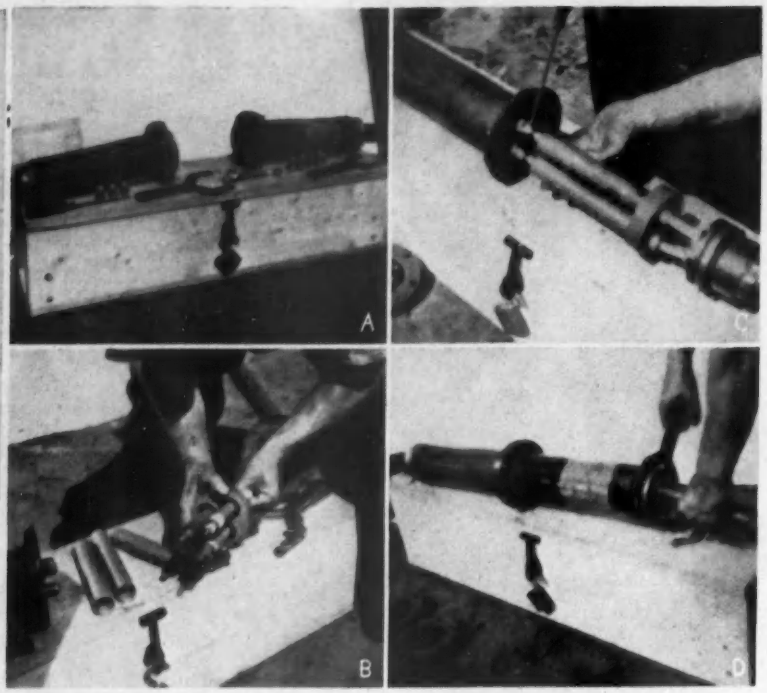


Fig. 2, above, shows the 11 kV tails connected by line taps to the o.h. line. On the right, Fig. 3 A to D shows four stages in making the joint, starting with half-joints and tools laid out on top of the joint box

The limitations of portable generating sets for purposes of restoring or maintaining even meagre amounts of energy are too well known, and adequate supplies on the scale visualised are far beyond the capacity of the average readily mobile set.

Because of the lengths of cable likely to be used in the make up of a particular section of feeder which needed to be taken out of service, and the possibility of having to provide for two faulty sections at the same time, special thought was given to the jointing technique. This is taken care of with the special plug-in type dry 11 kV 3-core joint made with all-shrouded contacts by B.I.C.C. Ltd. The cable, of which brief technical details will follow, is manufactured by Metropolitan Cables Ltd.

Fig. 3 A—D shows the making of a joint in various stages and the housing used in the final stages before the cable is energised. Slotted ramps provide protection when the cable temporarily crosses roadway or footpaths. In demonstrations and mock set-up the cable has been speedily run out, jointed, connected and energised at full voltage within one hour from time of arrival on site. Operating instructions have been completed and issued to field engineers and arrangements are now being made for full scale use of the cable for maintenance purposes.

Within the Essex Sub-Area in some 1,000 miles of 11 kV overhead line there are more than 150 cable sections integrated into the network and many of these cable sections form part of long spur lines. Lightning strike, mechanical damage, and ageing of the particular rural cable referred to has taken its toll and been the cause of long periods of outage. To combat this type of inconvenience and to eradicate the doubts of farmers about the reliability of supply, the flexible readily portable, easily connected 11 kV cable which at short notice could be quickly inserted at a faulty section, should play an important part.

The cable, capable of supplying 1,000 kVA, is made up of three separate flexible copper cores of stranded 75/·018 copper. Each core is insulated by an extruded coloured polythene sheath, the three cores are then laid up in a pre-formed p.v.c. cradle. The fillings are of jute and the whole is then covered in a p.v.c. sheath 0·08 in. thickness. Flexible galvanised steel armour wires are then applied and the whole covered with an outer p.v.c. sheathing.

Joints are of the air-insulated pattern 3-core plug-in type, and are made in two halves, the halves being coloured red and blue on the outside respectively. The half joints already made on to the cable have cover caps over the ends, and contain a silica gel pack inside which is removed before jointing.

The cable is made up in seven sections of varying lengths to cater for differing contingencies and is stored on five drums. The three main lengths are 400, 189 and 147 yards each and the remaining four pole-terminating lengths are only 13 yards each. Each small length of cable is provided with a converted linesman's belt ready for attachment to a pole.

Method of Laying and Jointing

Fig. 1 shows the cable laid out for the maximum run available. For the job in hand, however, the length required will generally approximate a road crossing between two poles. As a number of various lengths are available,

Fig. 4. When finished the joint is padlocked into the box provided

it will be possible to deal with two faults provided the cable lengths are long enough.

Having selected the cable lengths necessary for the job in hand the cable should be run out to ensure the half joint boxes mate red and blue, excess cable on the drum being unwound and flaked on the ground. When the joints are positioned end to end, the tools are removed from the wooden coffin and the half joints placed on top of the same ready for making up.

Cleanliness is essential during the jointing operation and in particular the operator's hands should be clean and dry to prevent the ingress of any moisture or dirt into the joint. Jointing instructions are contained in a waterproof folder in the wooden coffin. On completion, the joint is placed into the coffin before energising (see Fig. 4).

Simultaneously with the mating of the joints work should be proceeding on the connection of the three tails to the o.h. line conductor and the fixing of the flexible earth conductor to the terminal pole earth.

The cable and associated equipment are stored and maintained at Sub-Area Headquarters where a dwarf pole overhead line installation exists for the purpose of training and demonstrating. On request to the Control Centre (manned 24 hours) equipment and transport with technical staff if needed, can quickly be placed at the disposal of the District field engineers.

Aspects of Automation

THE advent of automatic control in industry on a wholesale basis has been heralded in many quarters by emphasis (perhaps over-emphasis) on its possible impact on employment. That there are a wealth of equally important implications requiring no less careful consideration was made clear by Mr W. Bamford, B.SC., the new Chairman of the I.E.E. Measurement and Control Section in his address on Tuesday last week. As might be expected, his main concern was investigating the responsibilities of engineers in this expanding field of automatic production.

The development of automatic control is a direct evolutionary extension of the historical facts of the Industrial Revolution, based upon the incentive to research and enquiry which characterised Great Britain at that time. It has been stated in the United States that 100 years ago the total energy used in industry comprised 22% human, 27% machine and 51% animal. In 1950, the corresponding figures were 2%, 96% and 2% so that there is no question of a saving in human energy in any discussion of automatic controls—the approach is rather one of labour using, enabling man's control of the machine to be speeded up.

Economic Considerations

The Chancellor of the Exchequer's promise that the standard of living in this country could be doubled in the next 25 years means, in effect, we must either produce more goods, or the same amount of goods in less time. His estimate, however, is one which some economists find hard to support—this country would have to maintain its 20% share of world trade although this share has been falling during the last 80 years. In accepting the Chancellor's idea, we are presented with the dilemma of full employment, which ensures that no additional labour can be made available. In fact, an average increase in productivity of only 1·5% has been estimated as the maximum attainable in this country. Yet the attempt to raise the standard of living by 2% per annum (the rate prevailing in the U.S.A.) requires a steady rise of 3 to 4% p.a. in industrial production and 3% p.a. in industrial exports.

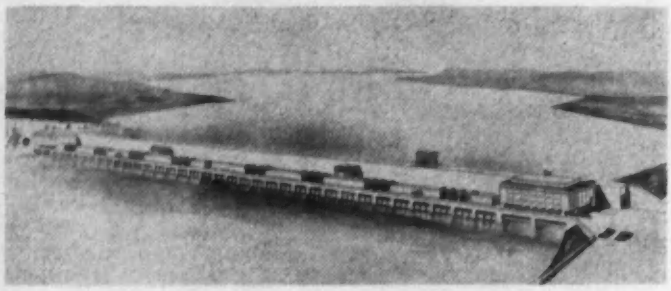
This depressing forecast almost completely ignores technical development as a means to increased productivity and it may be that our hope lies not so much in new techniques as in the application of existing techniques in new and hitherto untried situations. Such an approach emphasises the need for engineers capable of applying techniques rather than research scientists to find new ones. Wherever possible machines must be made to work without attention, for we cannot afford to neglect the automatic factory or its implications.

No matter what its political basis may be, the economic system is a self-regulating machine which, like all self-regulating mechanisms, requires its components and their characteristics to be fully understood and adjusted. Attempts have been, and are being, made to study this mechanism full of non-linear characteristics of a complex nature, so far without success. Would it not be well worth while to deal with the problems of an economic system on a more scientific basis of computation? Perhaps a country having a simpler economic system than that of the U.K. could have an analogue computer built up for it.

Industrial Implications

Looking at the industrial side of the picture, it is seen that the cost of providing employment for one man is becoming increasingly higher—expenditures of £10,000 per worker are quite common in modern schemes. Since it has been shown that automatic control does not lead to any reduced labour charge, which is already very small in comparison with the output, it is thus essential that early in the proceedings, involved in such schemes, initial investigations have to be undertaken into the plant if correct and efficient management of capital is to be ensured. If the final scheme is successful, the quality of the product is under stricter control than under manual operation, the improved quality also being accompanied by greater consistency as well as increased production. The plant must be designed for the method, as must the controls and the product also, which will require the highest accuracy of the primary measuring device. This, in turn, will effect an improvement in measuring units.

Capital expenditure, already high, is bound to be higher in new developments. For this reason, the technical approach assumes a greater importance, particularly in design and product engineering; the use of statistical information, duly digested by computers, must be undertaken. The value of the technical man is increased by the impact of automatic controls, yet there is disturbing evidence that engineers trained to design, install and maintain such equipment are likely to be insufficient in numbers for years to come. Attempts to improve this position must ensure that engineers are trained to think and to assess as a result of true basic understanding of science and mathematics. Moreover, the broader dissemination both of technical performance and of fundamental principles is essential; with less emphasis on the specialist approach. Above all, technologists must be trained so that they do not pass by on the other side when the social consequencies of scientists are considered. There is, moreover, the need for greater study by engineers of the actual applications of theories and principles, whilst impediments to the dissemination of technical information, imposed for fear of competition, must be overcome.



SIR ADAM BECK—NIAGARA NO. 2 NEARS COMPLETION

ST. LAWRENCE PROJECT UNDER CONSTRUCTION

Ontario Hydro forges ahead

A FURTHER year of intensive development is recorded in the 47th Annual Report for the year 1954 issued by the Hydro-Electric Power Commission of Ontario. From the engineering view the most important event recorded is the reaching of the final stages in the construction of the major hydraulic features of Sir Adam Beck-Niagara Generating Station No. 2. By the end of the year seven units were in service and good progress was being maintained toward the completion of the power house and the installation of the remaining five units. The turbines were built by the Dominion Engineering Co., Ltd., each having a rated capacity of 105,000 b.h.p. under a head of 292 ft and with a rotational speed of 150 r.p.m. They are spaced 55 ft from centre to centre and drive vertical shaft generators. Six of the twelve 3-phase, 60 c/s 13·8 kV generators were built by the Canadian General Electric Co., and six by Canadian Westinghouse Co. The generators have an individual rated capacity of 80·5 MVA at 0·95 p.f. The transformers are mounted on a deck immediately behind the power station, one bank of three 62 MVA single-phase transformers being provided for each two generators.

With the imminent completion of this major power project, the ancillary works on the pumped storage scheme and the remedial works above Niagara Falls are assuming increasing importance and work is being pushed forward rapidly on these items.

St. Lawrence Project

The St. Lawrence Power Project, which while a separate undertaking from the St. Lawrence Seaway is nevertheless intimately bound up with the latter is entering the post-planning stage. The installed capacity of the Robert H. Saunders-St. Lawrence Generating Station is to be 820 MW in 16 units (Ontario Hydro's share). There will be two adjoining power houses which will form an integral part of a gravity-type dam structure, two control dams and dykes to contain the head pond. The power house structure, bisected by the International Boundary will span the north channel of the river between Barnhart Island and the Canadian mainland at the downstream end of the island. The gravity dam has a length of about 3,250 ft, and a maximum height will be about 160 ft above the foundations. Construction will be carried out simultaneously from both shores. So far as the Commission is concerned the structure of the power house, which is of the modified outdoor type, will be novel in design. The generating equipment will be protected only by removable housings and the conventional superstructure will be confined to an erection bay at the shore end.

With the extension to the Pine Portage power house in Northern Ontario Properties, and the installation of the third and fourth units during 1954, the programme for this station was completed. It now has a dependable peak capacity of 118·3 MW in four units. Progress went forward on the construction of the Manitou Falls Generating Station which is scheduled to come into service next year. This plant which has the low rated head of 54 ft is designed for a 42,100 kW dependable peak capacity in three units.

Research and Testing

Widely varied research and testing activities were carried on during the year. Predominant was the work on the St. Lawrence Power Project and here a well-equipped soil testing laboratory was established in the field to meet the need for accurate data on soils to provide a basis for design and construction of the dams and power stations.

Stress analysis techniques have been used for a variety of purposes. Models provided an estimate of forces acting on the intake gates of the Sir Adam Beck-Niagara generating station No. 2 and at the Niagara River remedial works, strains were measured in a unit of the cofferdam during proof testing.

Measurement of ice thrust against several large concrete dams in northern Ontario was continued, and pressures as high as 20,000 lb per linear foot were indicated.

Studies were continued to show relative economies of line structures. Results have, however, strengthened the view that in Ontario prestressed concrete cannot compare economically with wood for transmission line poles.

A new method developed for more accurately forecasting daily peak loads was adopted on a trial basis for the Southern Ontario System, and a statistical procedure was devised for predicting the monthly average water levels at particular locations on Lake Erie and Lake Ontario for periods up to twelve months.

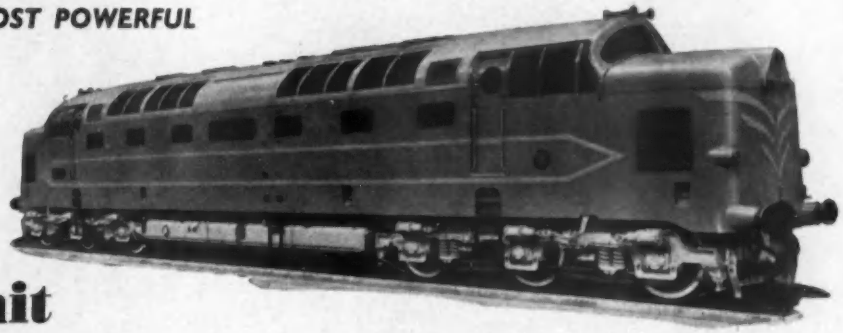
Field testing was carried out on thermal resistivity of underground cables, and work was done on the metering of power, using capacitor potential dividers, corrosion, line fittings insulators and constructional materials.

General Statistics

At the end of the year, the Commission's total assets were $1,653,063,771, after deduction of $154,975,237 in accumulated depreciation. Total gross revenue from the sale of electricity amounted to $146,953,335.

Dependable peak capacity of the Commission's resources generated and purchased, all systems, was 4,135 MW, and energy generated and purchased totalled 22,386m units. Delivery was made in bulk to 370 municipal distribution systems, to 188 direct industrial customers and to 105 rural operating areas. Ultimate customers served directly or indirectly numbered 1,467,034.

NEW DIESEL-ELECTRIC DESIGN CLAIMED TO BE MOST POWERFUL IN THE WORLD



Single-Unit Locomotive develops 3,300 h.p.

THE prime requirement of a single-unit main-line diesel-electric locomotive is to pack within the restricted dimensional space available sufficient power to enable the engine to undertake all duties connected with main line working. This implies that horsepowers in the range of 3,000 to 4,000 must be available; that the adhesion of the locomotive should be high to avoid slip, and that the reliability of the power plant and its auxiliaries should be particularly good. From an economic view, the diesel-electric locomotive needs to be worked for an extremely high percentage of its life, otherwise its revenue earning capability will be incommensurate with the high capital cost of the unit.

Much work has been done, both in this country and abroad to achieve these aims, but hitherto the most powerful single unit yet made, the United States "Trainmaster" has fallen short of the basic requirement with a total available horsepower of some 2,400 and a weight of 124 tons. The main difficulty has been the comparatively slow speed of the conventional diesel with its inherent crankshaft critical speeds, which generally lie within the working speed range of the engine. Thus the designer has had to accept the restrictions of either limited speed range, or even the establishment of three or more preset engine speeds, with the consequent complexity of electrical control gear to provide a smooth performance characteristic at the wheels over the available horsepower range. At the same time the low speed brings electrical difficulties in that the main generator must be large in order to develop the necessary voltage and power output.

Recently we were privileged to examine a locomotive in which at one stroke these difficulties have been overcome. This unit, built as a private enterprise venture without the sponsoring of any outside organisation, by the English Electric Co. is powered by two de-rated Napier "Deltic" diesel engines. These units, which have no effective critical speed within their operating range and which can, in their Naval version, develop 2,500 h.p. at 2,000 r.p.m. have been modified to run at a maximum speed of 1,500 r.p.m. and with an output of 1,650 h.p. A considerable increase in life is thus possible between overhauls, and it is hoped that such overhaul will only be necessary when the locomotive has to go into the shops for tyre-turning. The light weight and compactness of the "Deltic" power plant has also made it possible for a complete unit to be removed and replaced within a period of eight hours. Further, the capability of the diesel to run at any speed has led to considerable simplification in the fundamental electrical design of the control equipment and excitation circuits.

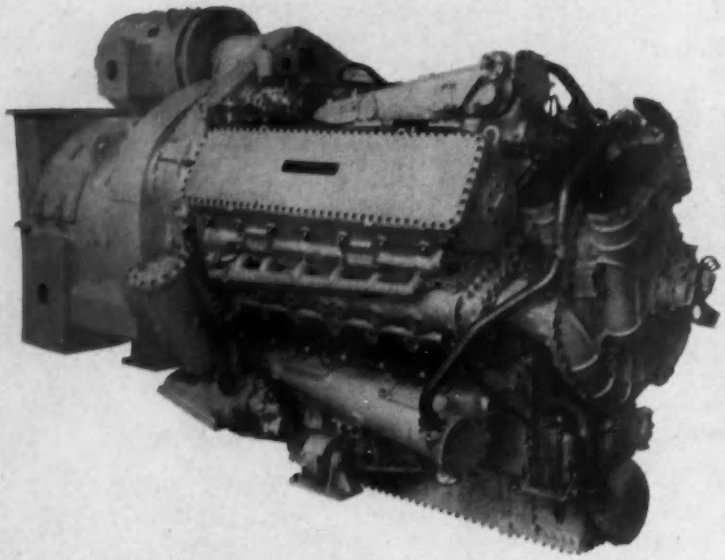
Because the "Deltic" engine has been built, for traction purposes, to a power/weight ratio of 6 lb per h.p., it has been possible to construct a Co-Co diesel-electric locomotive having a total h.p. of 3,300 with a maximum axle loading of 18½ tons. The locomotive has been designed for a maximum speed of 90 miles per hour and to provide the best possible characteristic for hauling various loads. It could reduce the timing of the fastest present-day run from London to Edinburgh by 30 minutes allowing for the same speed restrictions and operating margins.

PRINCIPAL DATA ON DIESEL-ELECTRIC LOCOMOTIVE

Diesel engines	Two 18-cylinder "Napier Deltic" 2-stroke.
Rating	3,300 h.p.
Tractive effort—maximum	60,000 lb.
Tractive effort—continuous	31,000 lb at 33 m.p.h.
Maximum service speed	90 m.p.h.
Number of traction motors	6
Weight in running order	106 tons.
Overall height from rail level ...	12 ft. 10½ in.
Overall width	8 ft. 9½ in.
Length over buffer beams	64 ft.
Bogie wheel base	14 ft. 4 in.
Distance between pivot centres ...	44 ft.
Maximum axle load	18 tons.
Minimum curve negotiable	6 chains.
Fuel capacity	800 gallons.
Heating boiler evaporation capacity...	2,000 lb/hr at 80 lb/sq in.
Water capacity for train heating fitted with water pick-up apparatus ...	600 gallons.
Brakes	Air on locomotive vacuum for train.

For normal working in railway service, both power units will run together. The engines are simultaneously controlled by means of air-pressure actuators operating the engine governor mechanism. The engine torque is automatically adjusted to the load and speed setting. Changeover switches are provided so that either power unit can drive all six traction motors, and, therefore, with only one power unit in operation the tractive effort of the locomotive is not affected, though the locomotive will operate at approximately half maximum speed.

Electrical contacts actuated by the servo-mechanism of the engine governor cause the field strength of the main generator to be adjusted so that at all times the output of the generator matches the available h.p. of the corresponding engine. Automatic continuous power control, throughout all engine and locomotive speeds, is thus provided.



The 18-cylinder Deltic engine seen here develops 1,650 h.p. Two such engines power the new locomotive

Layout

The locomotive superstructure is arranged with a long central compartment, a driving cab at each end of this compartment and a nose-end in front of each driving cab. The central compartment accommodates the two power units with the automatic oil-fired train-heating boiler approximately in the centre of the locomotive between them.

The boiler is capable of evaporating 2,000 lb of water per hr at 80 lb/sq in. Sufficient water for approximately four hours' operation of the boiler is carried and a bi-directional water pick-up device is fitted to enable the water tanks to be replenished from water troughs whilst the train is in motion. A storage battery, principally used for engine starting, is also accommodated between the power units, one half of it being placed against either side of the locomotive. Control cubicles at each end of the engine compartment form the rear bulkheads for the driver's cabs.

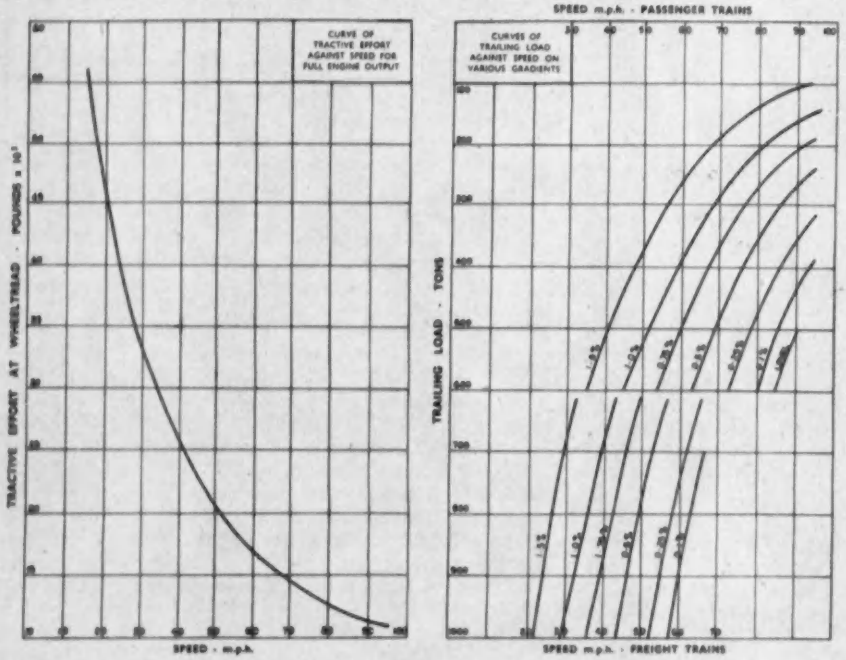
The nose compartments contain the air compressor and vacuum exhauster together with traction motor blowers, resistances, brake equipment, reservoirs and additional control equipment. Removable roof sections are provided above each nose compartment and over the engine generator compartments and boiler. The generator roofs accommodate the main air intakes for cooling the generators. The roofs over the engine accommodate the radiators and fans for the engine coolant and lubricating oil. The radiator fans (two for each engine) are mechanically driven from their respective engines. The roof over the boiler which also covers the silencers, accommodates the air intakes for the engines and boiler fire.

Fuel tanks and boiler feed water tanks are carried below on the underframe.

The engine embodies a triangular form of cylinder disposition. It is an 18-cylinder, opposed piston, water-cooled diesel engine, operating on the 2-stroke cycle. The cylinders are arranged in three banks of six cylinders, each bank containing a crankshaft, the cylinders forming, in end view, an inverted equilateral triangle. At the driving end of the engine a train of gears connects the three crankshafts to the main output shaft at the centre of the triangle, the overall ratio being 1/1 and the maximum speed 1,500 r.p.m.

The main output shaft of the engine is rigidly connected to the main generator armature shaft. An auxiliary output shaft is driven from a tributary gear train and runs at 1·679 times the engine speed. The shaft supplies the drive to the auxiliary generator armature and to the cooling fans for the radiators. Engine starting is obtained by motoring the main generator with power supplied from the storage battery.

Each main generator is rated at 1,080 kW at 650 V for normal continuous running, although as is common practice with traction machines much higher short time ratings are acceptable and the voltage may be raised to 800. Traction motors similarly are wound for 750 V working. The generators are fully compensated to allow for the production of very high currents at extremely low voltages.


CURVE OF TRACTIVE EFFORT AGAINST SPEED FOR FULL ENGINE OUTPUT
TRACTIVE EFFORT AT WHEELTREAD - POUNDS x 10³
SPEED - m.p.h.
SPEED m.p.h. - PASSENGER TRAINS
CURVES OF TRAILING LOAD AGAINST SPEED ON VARIOUS GRADIENTS
TRAILING LOAD - TONS
SPEED m.p.h. - FREIGHT TRAINS

The curves on the left show the characteristics of the new locomotive under various service conditions. Extreme left is the tractive effort characteristic

A Story of Southern Success

CONTINUING our survey of Area Board commercial activities we recently visited the Southern Board and here we found excellent achievement since Vesting Day in the general development of electricity supply throughout the Area, and in the simplification of tariffs resulting from a sound, prudent and far-sighted commercial policy pursued by an enthusiastic, hard working staff.

Tariffs Standardisation

Inheriting an area of over 6,500 sq miles with a population of close on four millions containing 48 separate undertakings (22 Local Authority and 26 Company) between them offering literally hundreds of different tariffs (there were no less than 125 in the domestic field alone), the Board has replaced all these with standard tariffs for domestic, commercial and farming consumers throughout the area and is actively engaged in the production of standard tariffs for the remaining group of industrial consumers.

The domestic tariff is a variable block tariff with the primary units based simply upon the number of rooms; for commercial and farming consumers there is a variable block tariff with the primary units based simply and realistically upon the installed load. An optional alternative M.D. tariff is available for this class of consumers.

In thus replacing all the old tariffs with standard rates, the Board has been very much alive to the need for attracting off-peak loads to its system and for this purpose has made available a set of tariffs to meet all the varying requirements of such installations. The general development since Vesting Day is shown impressively in the diagram on page 593.

In the year ended 31st March, 1955, the number of farming consumers in the Area increased from 16,046 to 17,281 and units sold for this purpose have gone up from 107·4 millions to 129·3 millions, showing a rise in units sold per farming consumer from 6,692 to 7,480, the highest of all the Area Boards. In fact, the development of the rural area served by the Board is even better than these figures indicate since no vast tracts of territory remain beyond the reach of the Board's network.

Reading Service Centre is seen above

Farming Specialists

The recipe for this success we found in efficient organisation and the policy of personal contact. So well geared up to the task of rural development is the organisation that it employs the largest specialist advisory staff of all Boards. Each Sub-Area has an Agricultural Development Assistant and each rural district an Agricultural Representative. They have specialist knowledge of the problems and practice of farm electrification and meet in conference from time to time to keep up to date with new development in electricity supply and agriculture. Close liaison is maintained with Reading University, which has a world-famous Faculty of Agriculture, the E.R.A. Field Station at Shinfield, the National Institute for Research in Dairying, the various farm Institutes in the Area, and, of course, with the Regional Officers of the National Agricultural Advisory Service. In fact, we noted with interest that plans are afoot for a full-scale conference on rural electrification between the Board's staff and Officers of the N.A.A.S. Incidentally, Roy Hay's B.B.C. talks on the radio frequently come from his demonstration garden at Godalming, where the S.E.B. have taken a special interest in ensuring the availability of a complete range of electro-horticultural equipment. The Board takes part in most of the Agricultural Shows in the Area, usually over 25 each year, and has twice "coped" with the Royal Show, at Oxford in 1950 and Windsor last year.

Consumer Service

Unfortunately, our visit was so brief that we were able to visit only a few of the Districts and Centres, but if, as we believe, the spirit underlying the activities in these

Unique activity of Southern Electricity is this stall which is a permanent feature at Dorchester market. The District Agricultural Representative is seen talking to a farmer

places is general throughout the Area it is surely responsible for the high standard of service which all S.E.B. consumers enjoy. In all, there are 112 Centres providing consumer service. They all follow a general "open" plan of layout, amended by local considerations of space and siting, in that the cash collection and accounting bureau is usually approached through an avenue or display of appliances. At Ealing centre, a former municipal showroom, the consumer enters the central doorway and passes across to the cashier on the right past an attractive display of appliances. A demonstration platform is erected in a corresponding position on the left of the entrance and is approached past a similar display. Major appliances are grouped together to afford easy comparison, a factor in sales promotion which is often overlooked, and are, we understand, moved from one section of the Centre at frequent intervals in order to encourage consumer circulation around the displays. Ealing showrooms are fortunate in their full length windows which afford both a light interior and easy arrangement of displays to attract passers-by. Lighting fittings were not featured but we found a useful system of introductory cards provided by manufacturers for consumers to visit their London Showrooms.

Saturday afternoon opening has been tried out at Ealing but was found quite unprofitable. Saturday mornings see the Centre crowded but afternoon response has been negligible. Far more business is transacted in the Centre during the Wednesday closing day afternoons.

Initiative and enterprise shown by local S.E.B. staff won them first prize at Lyndhurst carnival. "Splosh and Squeeze" washdays were cartooned on the trailer affording a telling comparison with the "Wash at Ease" tableau on the tug vehicle

Typical of the smaller Service Centres, Marlow and Henley were included in our itinerary. Marlow is fortunate in having a small demonstration room although it is not in use at the moment as the Supervisor has resorted to a series of outside demonstrations in order to get a wider coverage.

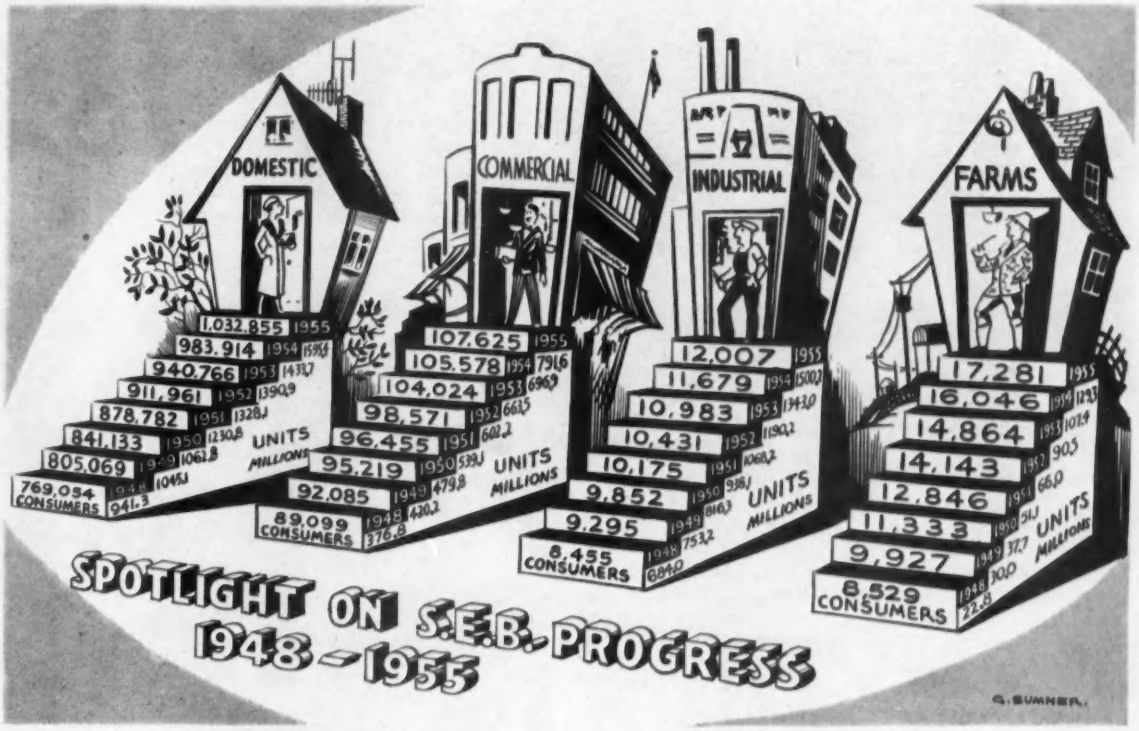
Reading is a busy, bustling town, and its Service Centre is no exception to this air of "liveness." At the time of our visit the Centre was crowded. Unusual, but enterprising we thought, was the sale in progress of shop-soiled and slightly outdated appliances. Again, the arrangment of the Centre was of the open plan. Consumers paid their accounts at the bureau on the left of the main doors whilst stretching away diagonally right was an inviting avenue of cookers, washing machines and refrigerators well displayed and lighted.

At Newbury, the Service Centre has been extended recently by the addition of adjoining premises and now

Electric House Weymouth is one of the Southern showpieces, but it is also a highly effective service centre

occupies the site of what was previously three small retail shops, the new part being used to provide an effective demonstration theatre clearly visible from the street outside. The district demonstrator was herself most enthusiastic about the new arrangement and has quickly arranged a series of weekly cookery and washing demonstrations alternating each week from afternoon to evening sessions. Behind this theatre is an appliance store of ample capacity which has been doubled by the enterprising use of an electric fork lift truck.

The testing and examination of domestic appliances for sale in the Service Centres is undertaken at Uxbridge, in the sub-area repair and reconditioning depot, where the Board has a small but well-equipped proving house. A portable fire by a well-known maker, on test at the time of our visit was one of 314 appliances examined during this last year. All new domestic equipment undergoes stringent tests for performance and safety and, depending upon the result and the market potential, is graded if satisfactory either for general sale or for sale against specific orders. A measure of the thoroughness is evident in the rejection in the same period of 112 of these appliances



and the modification by manufacturers of a further 86 items as a result of the Board's representations.

All sales and service centre staff are encouraged to take the E.D.A. Salesmanship examinations and in the last year 21 members gained the certificate and 10 the diploma award, a really creditable achievement.

Training Schemes

Newbury Sub-Area earlier this year arranged a highly successful course of training for showroom and service centre staff which may be the basis of a future Area Training Scheme. Seventeen newly-appointed staff assembled at the sub-area office for a training programme which covered all Service Centre duties. On the first day the students studied the organisation of the Board and fundamental electrical matters. Lectures followed on tariffs, consumer records, stock control, salesmanship, window displays, etc., which helped students to gain more from the experience of their daily duty. A second stage of the course was devoted to practical instruction in all the major electrical appliances with particular emphasis on the advantages of electric cooking and water heating.

The training of staff, in general, is regarded as a matter of great importance by the Board who have instituted a most comprehensive programme. This includes formal five-year apprenticeship schemes for craftsmen with carefully-designed syllabuses of practical experience and the facility of day-release in order that the boys can study for the appropriate City and Guilds courses. With the immediate object of providing a thorough training leading, in the first instance, to junior and middle positions in the commercial department, the Board have introduced on an experimental basis a unique student commercial engineering apprenticeship scheme. The first three years of training follow the lines of that for apprentice electricians with additional experience on mains networks. The remaining period is devoted to training in sales and showroom organisation, administration and accounts, and specialist refrigeration and agricultural applications. In each of the last two years the apprentice attends a special sandwich course in electrical engineering and commerce at Portsmouth Municipal College, this course leading to a certificate in Commercial Electrical Engineering, issued by the College and endorsed by the Board.

For all other commercial staff a progressive and continuous scheme of training is in operation. Short one- or two-day conferences are organised at each of the four sub-areas for junior and middle level staff and at Head Office for senior staff. During last year, for example, 47 courses were arranged with 1,224 staff attendances.

Proper attention is also paid to the training of supervisors at all levels and charge-hands, foremen and equivalent levels from the commercial department attend the regular training courses at sub-areas conducted by the

Though showroom interiors are necessarily dictated by size and shape, Swindon can be called typical of the general appearance of S.E.B. centres

Attractive stand arranged by the Southern Board at Portsmouth is but one example of the enthusiasm of the employees

Board's full-time training tutor. In addition, periodic conferences are arranged for senior supervisors up to and including the level of District Commercial Engineer, and are organised at the Board's Head Office. Supervisors also attend courses arranged by the adult residential college and national organisations.

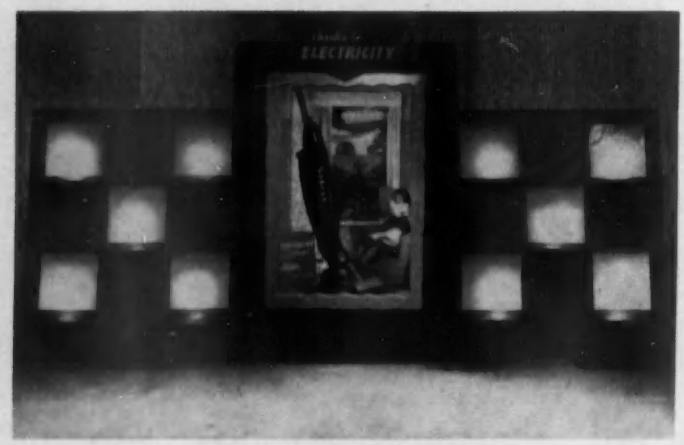
Sales Promotion

Publicity and display material of a high standard are produced at the Central Display Studio recently inaugurated in its new home in the old Windsor Generating Station. Nucleus of this new section was the former Southall Sub-Area Display Studio and, we understand, that when the studio really gets under way, window displays and display material will be supplied regularly to all Service Centres, and the staff will also receive assistance and encouragement in preparing their own ideas in display work. Equipment at Windsor is produced by orthodox methods, but recently a successful venture was made into the use of plastics for producing tickets and badges. A most practical design of price tickets has been produced by the studio staff which could well be copied by many other organisations. The ticket uses sliding sections in which can be inserted the cash price, minimum deposit, quarterly payment and cost per week. This standardised form of price statement is appreciated by many prospective customers for it affords the opportunity of quiet comparison before making a positive enquiry.

Advertising material has been concentrated on water heating in the spring and summer of this year and it was intended to feature electric cooking in the autumn and winter, but this has had to be abandoned following restrictions on promotional activities. A new and successful campaign to promote the use of immersion heaters was launched this spring in the local press, by advertisements in public vehicles, and films in the local cinemas.

Close liaison is maintained with E.D.A. on promotional matters. Local exhibitions, film shows and lectures to such bodies as the Women's Institutes, Farming Clubs, etc., are frequent in the districts. Most notable amongst the outside publicity activities of the Board last year was the two-day exhibition and cooking demonstrations in Reading's Olympia Ballroom with Philip Harben, the TV cook, appearing in person. So great was the response that Philip Harben was at short notice engaged to give an additional show. Displays of cookers, water heaters, refrigerators and kitchen ware, in which the manufacturers willingly co-operated, attracted very much attention, especially after clever references, during the demonstrations, to new cookers being available on deferred terms for less than the price per week of a packet of cigarettes. One novel feature of the demonstration was the team of six small girls who faultlessly dismantled and reassembled one of the cookers to show ease of cleaning.

Price ticketing has been standardised with this attractive green, yellow, white, and clear card which has slots for inserting details



This display piece for use in Southern service centres has illustrated panels against which the smaller appliances can be attractively shown

Highlights like these are representative of the actvities of the staff throughout the whole area and exemplify, what was most noticeable to our representative, the spirit of keenness which pervades all S.E.B. activities. We wish them every success in their effort and would like to thank the chairman and officers of the S.E.B. for their kindness in granting us facilities for our visit.

notes on wiring

by Megohm

IT is quite a common thing to read in the daily newspapers of articles and commodities going up in price. In the building trade there have been increases in the cost of labour and this has greatly affected the cost of houses. Electrical installation costs have gone up during the past months and this has the unfortunate effect of making prospective house-owners do with fewer sockets, etc. It is, therefore, welcome to find a manufacurer who has seen the danger of this and also realised that something must be done to halt this constant upward trend in costs.

The manufacturer concerned has for some time now concentrated on house installations combining good quality accessories with clean lines which are pleasant to the eye. Their plate-switch received special mention at the British Plastic Exhibition 1955 and this is one of the accessories which are being reduced in price. Another is the 13 A switchsocket and this is, in my opinion, a real step to assisting housing authorities to provide a few extra sockets and avoid the use of adaptors and long trailing flexible cords. I still feel that many authorities are not making full use of the 13 A socket ring circuit arrangement which has been the subject of so much debate and development. The fact that these sockets are being reduced in price may once again jog the memories of the people concerned on this method of wiring sockets in the home.

Plug or Plugtop?

Recently on this page I mentioned a "plugtop," and soon afterwards received a letter pointing out that there was a *top to a plug*, but that the assembly should be referred to as a *plug*. I stand corrected, although the term is widely used in the trade catalogues, and I am requested by the correspondent to co-operate in stopping the use of this term.

The dictionary defines a socket as "a hollow into which something is inserted" and a plug as "a block or peg used to stop a hole," so it must follow that a "plugtop" is the top of the plug. But, if I send someone to purchase a "switchplug" do I get a switchplug or a switchsocket? I get a switchsocket usually, but is not a switchplug, in fact, a plug with a switch incorporated? Such an accessory is manufactured and is referred to as "13 amp Fused Switch-plug."

A representative of a manufacturer informed me that they experienced some trouble with the references to "switch plug units" and "switchsockets," the latter being switch and socket assemblies. The more this matter is looked into, the more confusing it becomes and it would appear that something can, and should be done about it. Of course, we do find that the general ironmongery store comes into the picture in this instance. Most of these shops, and the chain stores, display switches, plugs and other electrical gear (of doubtful character at times) and if one asks for a certain article by its correct term, the assistant usually stares back in amazement. He then fumbles around and finds what he thinks is the article and proudly pushes it in your face for approval.

Such articles as plugs and so on are quite household articles these days. So often the housewife buys a new standard lamp or other adornment for the home, and then has to determine the type of plug required when she gets home. It then takes her some time to describe to the supplier the type, size, colour of the plug, etc. Yes, indeed, there appears to be room for improvement in naming the various electrical accessories *correctly* for once and for all. There is also much to be done in educating the user of electricity in the correct way of having appliances fitted.

Fatal Accident

I recently read in a small booklet of a fatal accident due to the wrong connection of an Edison-type screw holder and "wrong switch polarity." It is not only this breach of the Regulations that worries me, but the recorded fact that one electrician was reported as having admitted to seeing one such lampholder connected in the wrong pole, but did nothing whatever about it.

The reason given, in cold print, the article goes on to say, was "that there might have been others similarly wrongly connected and if he rectified the one he might have to rectify all the others."

This, I feel certain, must be an isolated case, for the operatives in the electrical industry are all too conscious of the dangers of electricity if not handled properly. It is, however, a point to remember that wrong connections on a plug can also prove fatal and I make no apologies for repeating my words that everything must be done to discourage the amateur wireman, and the people who sell shoddy articles with little concern for the safety of the unsuspecting householder. A safety campaign in this field is long overdue.

Ducts Cast "in Situ"

The 13th Edition of the I.E.E. Regulations makes special mention of ducts cast "in situ" (whether or not embodying channels or formers retained in position after the concrete has set). One such method of casting ducts in this manner is by means of an inflated tube around which the concrete is cast. When the concrete has set, the tube is deflated and withdrawn leaving a duct through which cables can be pulled. This method has many applications, some of which are not directly connected with electrical installations, but to assist electrical contractors two non-expandable formers have been introduced on the market. One former is for ceiling outlet points and the other for switches and socket outlets.

The ceiling outlet former is similar to the B.S. standard type box, but with a uniform taper for withdrawal. The former is made in two types, the difference being that one has two pins projecting from the back of the box, which form holes for rawlplugs, and the other has metal sleeves tapped for 2 BA screws, which remain in the concrete when the box is removed. A central screw enables a firm anchorage to be made through the shutter to a notched steel strip.

Surveying the Supply Industry

I.E.E. Local Centre Addresses concentrate emphasis on aspects of Electricity Supply

RANGING over the first two weeks in October, the addresses of the Chairmen of the I.E.E. Local Centres usually provide a wide survey of the electrical industry reflecting the interests of individual speakers. This year's Addresses provide the same general picture, portraying amongst other things both the generation and distribution aspects of electricity supply.

For an illuminating picture of the life of a District Manager, attention is turned to the East Midland Centre, whose chairman, F. R. C. Roberts, M.I.E.E., is the East Midlands Board's District Manager at Spalding. Equivalent to the Engineer and Manager of pre-vesting days, the District Manager is the only employee of the Board in a District who has authority to speak officially for the Board. All decisions and responsibility concerning the District rest with the District Manager, even though he may seek advice from specialists at the Area H.Q. He must, however, constantly bear in mind that he is part of a national undertaking in which local decisions may possibly have an effect on the whole industry.

Area Board Organisation

In the Area Board organisation, the direct line of authority runs from the Chairman and Deputy Chairman to the Sub-Area, and then the District Managers. To facilitate working, however, "by-pass" lines of communication exist between various members of the staff to save time when routine matters are handled. This type of three-tier organisation, with "single headed" districts having only one person in charge of a district, provides considerable decentralisation and is particularly suitable for rural areas, where two-tier organisations would probably not be an economic proposition. Larger Districts, responsible direct to H.Q. would become, in effect, miniature Sub-Areas with considerable loss of personal contact, both between members of the staff and between the staff and consumers. In the normal District organisation there must be delegation of authority by the Manager to his senior staff, which requires a competent District Manager who knows, understands and can lead the men under him.

The District Manager's work includes the allocation of capital expenditure, with the aim of ensuring maximum revenue from it. This also involves balancing the work between the District staff and outside contractors. Another part of his activities comprises the organisation of transport, labour force and materials, in the light of local characteristics, for both distribution and contracting activities, whilst a constant watch must be kept on wages and salaries, stocks, and, of course, the main source of revenue —meter readings. It is also necessary to have accurate and up-to-date knowledge of the distribution system loadings, with an eye open for reinforcement where necessary. Apart from these activities, contact must be maintained with local organisations, internal conferences attended, and the welfare of all employees considered.

The generation aspect was dealt with by F. Barrell, M.I.E.E., M.I.MECH.E., A.M.I.I.A., in his address to the North Midlands Centre, which reviewed the development of power station construction in Leeds and the surrounding area. After briefly sketching the historical background, he showed how the pre-vesting day design development and construction of the Leeds power stations established a specialised department within the Leeds Electricity Undertaking which, on nationalisation, became the nucleus of a larger organisation for the construction of power stations in the wider area of the Yorkshire Division.

Locating power stations is becoming ever more difficult, especially since the most valuable sites have now been used. A wide variety of factors bear on the suitability of a site but the requirement for ample cooling water usually presents the most acute problem and has influenced the location of recently constructed power stations more than any other. In view of the high costs of both coal transport and transmission, it is of economic value to make the greatest use of the cooling effect of all available water supplies if this helps to reduce the distance over which coal has to be transported or output transmitted.

Cooling at Skelton Grange

This principle was applied in designing and locating the Skelton Grange "A" power station, for which the chief source of cooling is the River Aire having a flow ranging from 2,000 million gallons/day in extreme floods to a minimum of 33 millions. The latter is largely effluent from the upstream side of Leeds and excludes that from Leeds itself. The same river, however, on its upstream side, also serves the Kirkstall and Whitehall Road power stations, which has some effect on the water temperature at Skelton Grange. On the other hand, at the minimum flow, the rate of flow is also a minimum, giving the greatest cooling with distance. A complicating factor, however, is the use of the river as a navigation canal. Whereas this assists cooling for the two upstream stations, by virtue of the greater volume of water impounded, the canal leaves the river upstream of Skelton Grange and since it requires 20 million galls/day of make-up water, a high proportion of the minimum flow is lost to the station. Moreover, the canal make-up depends on traffic and hence the rate of make-up flow is greatest during the daytime, when it may even exceed the minimum river flow.

In this case the problem was overcome by providing a water re-circulation system between canal and river. The system enables water up to 90 million galls/day to be pumped into the canal from a point nearly two miles downstream from the station. A substantial part of this water travels upstream along the canal, spilling back into the river above the power station, whilst the 20 million galls previously required for canal make-up are now available for cooling purposes. At least 100 million galls are impounded in the re-circulating system enabling the cooling effect to be spread over 24 hours. Moreover, the effluent from the Leeds sewage works is also available, whilst 10 million galls can be pumped back each day into the sewage works, thus making use of 36 acres of bacteria beds for cooling. Cooling towers supplement up to half

the cooling requirements. The total flow of cooling water for the 360 MW station is 372 million galls/day, dissipating approximately 6,200 B.Th.U.'s per unit generated.

An associated problem arises with Wakefield "B" Power Station, where the development of control over the discharge into rivers has complicated the cooling position still further. At present, an interim trial period, during which detailed observations are to be made, has been agreed. The results will be a national issue, requiring thoroughly analysis and careful consideration before a final decision can be made. There must be a clear policy, giving the amount of heat which can be absorbed by rivers, to ensure a balance between the amount of disturbance and the effect on fuel usage.

In the light of the aim to double the standard of living in 25 years time, electricity supply, having to meet the consequent increased demands from both industry and home, will have to develop at twice the rate at which the standard of living rises. This means that by 1970, a total of 14,000 MW of new plant, apart from that contributed by nuclear energy sources, will have to be found. In part, this increase will be met by a few hydro-electric stations and by power exchange with other countries. Most of it, however, will have to come from new large coal and oil-fired stations and pumped storage schemes.

Yorkshire's contribution to the required increase in output largely depends on coalfields in the area. The two largest N.C.B. divisions, North Eastern and East Midlands, which together, last year, produced 43% of the country's deep mined coal, are the two in close proximity to, and associated with the supply of coal to Yorkshire. It is also of importance from the point of view of cooling, that the main rivers flowing through these two N.C.B. division discharge into the Humber, within the Yorkshire Division of the C.E.A. Economic conditions, therefore, justify a few of the eleven new coal or oil-fired power stations being located in the Yorkshire area.

Transmission Development

Another facet of Electricity Supply is that of power transmission, the subject chosen by H. S. Davidson, T.D., M.I.E.E., Chairman of the South Midland Centre. His address provided an up-to-date review of developments having taken place during the seven years since nationalisation, in which the grid system grew from 3,700 to over 5,000 route miles of 132 kV line, a rise of 35% and the transformer capacity has risen by over 60% from 14,300 MVA, to 23,400 MVA. The 275 kV "super-grid," involving the erection of some 22 substations and 1,150 miles of o.h. line has been the outstanding development, 340 miles of it having been erected so far, with 40 miles operating at that voltage. In the seven years under review, schemes estimated at £130 millions have been approved.

In general, extensions of the grid system fall into two categories—those necessary for the export or import of energy at, and the interconnection of, generating stations, and those needed to afford increased supplies to Area Boards. Design of the system must facilitate operation of power stations to the best advantage—restrictions on the use of the most efficient plant which may be caused by system outages, result in severe financial loss. Area Board demands have also to be met, to which end long term planning and joint consultations are necessary to ensure the adoption of the best overall scheme. This was not always the case under independent operation, and already savings estimated at over £11½ millions have resulted from this policy.

Of civil works, special care is required in the preparation of foundations and access roads, requiring investigations into the load bearing properties of the sub-soil, in view of the greater weights of switchgear and transformers. Site areas have also increased with the adoption of higher voltages, a 275 kV substation controlling 20 circuits being some 1,100 ft long by 450 ft wide. A large measure of standardisation in the civil works has been achieved and the general layout of substations can be the same in most cases. This has resulted in the adoption of standard ferro-concrete structures requiring only slight modification to allow for variations in the type and make of switchgear and transformers.

Modern Switchgear Developments

Much of the development under the general heading of switchgear relates to the increase in the magnitude of fault energy. Originally having a rating of 1,000 MVA (although in some cases these had been uprated to 1,500 MVA), 132 kV gear is now required to have fault capacities of 2,500 MVA and 3,500 whilst at 275 kV the specified rating is 7,500 MVA. In general, busbars, isolators and fittings on the original grid scheme were liberally designed, and little alteration to these had been needed. Circuit-breakers in use are bulk oil, air blast, and small oil volume, the former two giving good service and still being installed. The latter is to some extent a compromise between the other two, but has certain limitations at present. Restrictions on capital expenditure in recent years have been responsible for many innovations at substations, the latest development being the four switch substations controlling four feeders and four transformers. The reduction in the number of c.b.'s used has inevitably complicated protective circuits, the inter-tripping of several breakers, often at widely separated points, being frequently necessary on the occurrence of a fault.

In the installation of transformers, the trend has been toward larger units, although sizes range from 15 to 120 MVA. At bulk supply points, sufficient transformer capacity is provided to meet the load assuming the largest unit to be out of commission; thus a minimum of two transformers is required at any point. Due regard is also paid to the capacity of interconnection on the Area Board's system in assessing the firm's capacity when more than one bulk supply is concerned. More accurate representation of the temperature inside the transformer windings enables greater use to be made of the overload capacity, which is now, with certain reservations, accepted as 30%. Greater use is also made of automatic voltage control in conjunction with supervisory control schemes.

There has been little change in the design features of o.h. lines used on the system and, unless there is some change in the statutory regulations, none can be expected. Of cables, there is about one-tenth the mileage of o.h. lines, although the number of separate installations is quite high. The 275 kV system will call for cable in certain circumstances and two types of both gas pressure and oil-filled cables are undergoing tests under service conditions at that voltage.

When considering maintenance, the complexity of certain switching arrangements already referred to makes for complications and adds to the risks of supply interruptions. For transformers, maintenance is largely confined to the tap-changing gear, the greater use of automatic voltage control requiring increased attention. Any design improvements which can be effected in tap-changing gear, particularly of the diverter switches, will be of value in removing transformer outages. The underground cable system calls for little maintenance, apart from the greater importance of methods for detecting gas leakage consequent upon the increasing mileage of gas pressure cables, and experiments in the use of radio-active tracer gases are now being made to this end.

Difficulties in Nigeria

THE third Annual Report and Statement of Accounts of the Electricity Corporation of Nigeria covers the year ended 31st March, 1954. The difficulties of the Corporation, particularly with the reorganisation of the accountancy system and the lack of detailed financial information still continued, although energetic steps are being taken to place this on a sound footing. These difficulties stemmed from the change-over from government to commercial accounting. The staffing position, particularly on the technical side remained unsatisfactory and at times the shortage of qualified electrical engineers has been critical. Lack of funds also restricted the investigations into future technical development.

Financial

On the financial side the year's trading shows a loss of £247,184. Income from sales of electricity was £1,187,822, and other revenue accounted for £71,592. Generation, distribution and administration expenses amounted to £1,088,991, leaving a surplus of £170,423. A grant of £30,000 was received from the Government in respect of uneconomic undertakings. Thus the total operating surplus was £200,423. But taking into account depreciation, interest, and other items the loss appeared.

During the year the Corporation sold some 90 million units, an increase of 16·89% over the previous year's figures, but during the same period, new plant commissioned amounted to less than 10% of the plant previously installed. The load increase could not readily be handled by the generating plant and the distribution system with the result that there has been a tendency for distribution losses to increase and voltage regulation to deteriorate.

The Report gives details of the installation work at the several power stations operated by the Corporation. Most of this plant is diesel-electric although at Port Harcourt, Oji and Kana, steam plant is in operation or in process of erection.

The transmission system is being reinforced and strengthened, and the survey for the Oji River—Onitsha 66 kV transmission line is in progress. Construction at Ijora "B" has been better than anticipated and it was hoped to begin steaming trials before the end of 1955. This station is scheduled for 2 × 12·5 MW sets. Progress at Oji River, however, was less satisfactory and the station was not likely to be commissioned before mid-1956.

Striking rises in local consumption are reported. Ibadan for example showed 39% over the previous year, Port Harcourt 40·34%, and Kano 34·37%. It is expected that the rate of growth for the whole of the Corporation will rise in 1954/55 to 23·2% if the commissioning dates for new plant in that year can be adhered to.

Electrical Engineers at Large

THERE is opportunity and interest for electrical engineers in jobs outside the main electrical engineering industries. This opinion was voiced and developed at the I.E.E. last week when the chairman's address to the Utilisation Section was delivered by Mr D. B. Hogg, M.B.E., T.D., M.I.E.E. Mr Hogg estimates that there are some 10,000 professional engineers engaged in "user industries" in this country; that is in industries other than electrical manufacturing, supply or contracting.

These appointments outside the electrical industry give their holder opportunity of becoming an "engineer" in the fullest sense instead of an "electrical engineer." In most cases, a wider interest is forced on the electrical engineer in the user industry. To quote Mr Hogg, the problems in "other industries" are so wide that the electrical engineer who is fortunate enough to work in any of the larger ones is encouraged to explore other engineering and scientific fields. In the course of time he acquires a knowledge of many things other than those of a purely electrical nature, which is good for him and for industry generally. While he is unlikely to become an expert, he will know what is being done and where to go for information.

Expanding this point about "good for industry," Mr Hogg maintains that there is still a good deal of *mystique* in British industry. The well-educated and intelligent engineer looking at an old trade from the fresh angle of his training and scientific background should be able to sort the "wheat of inherited skills and know-how from the chaff of dead custom and inertia."

Responsibilities of the electrical engineer outside electrical firms may range very widely. Design, construction and maintenance all bring their special problems and opportunities, which are summarised in this address. The emphasis is on variety. Although the electrical engineer may have little to do that will not fall to the lot of some of his brethren in the more specialised electrical industries, it is probable that the number of different duties which one engineer in the user industries has to undertake will not be equalled elsewhere.

Breadth in Training

In the concluding sections of his address, Mr Hogg takes a line on training away from the usual suggestion of a post-graduate course with a large electrical manufacturer or supply authority. He notes that for many years a few of the larger firms in industry generally have made special efforts to recruit university graduates and train them in their own works. He considers that there is no doubt that taken as a whole, although these men may never have a detailed and intimate knowledge of how to rewind a motor, or be able to dispute from personal experience with cable jointers, their fundamental knowledge and training to think carries them more readily into the higher paid posts, and at an earlier age than is often attained in other circumstances. Men from university have proved more adaptable and less inclined to follow slavishly previous practice. Also, they can more readily be given jobs to do which are not essentially electrical.

The conclusion from all this is quite firm in the mind of the Utilisation Section's new chairman. There are many trades in this country having large enough units to employ electrical engineers of professional status. Apart from rewards of experience and interest, the financial opportunities are at least as good and often better than in electrical manufacturing and supply. There is plenty of room today for good men and especially for men with a good honours degree.

FLOOR WARMING

INSTALLATION SYSTEM DISPENSES WITH CABLE CHANNELLING

for a new showroom

SPACE saving, adequate ventilation without excessive heat loss and low maintenance costs are among the advantages which have led industrial and commercial organisations to show an increasing interest in electric floor-warming systems. Operating costs of these installations compare favourably with other heating systems, since once the entire floor mass has reached its optimum temperature, a thermostat switches off the input supply and regulates power consumed to the temperature required. In addition, buildings containing floor-warming systems are normally heated at night when lower tariffs are charged. These advantages coupled with additional space made available by the absence of usual heating appliances, led Burton and Deakin to employ floor-warming in a newly-erected motor showroom adjoining their garage at Orpington, Kent.

Designed and installed by the South Eastern Electricity Board, the complete system warms an area of 1,440 sq ft with a loading of 15 W per sq ft. Utilising experience gained from previous installations, the Board found no difficulty in constructing a modern showroom floor on the site of a previous garage workshop. The old building was stripped to its framework and the floor removed to expose the bare earth. To form the base of the new floor, a 6 in. layer of hard core was covered by 4 in. of concrete to receive the heating cables. In all floor heating installations, the method of laying and securing the cables in the concrete screed provides the greatest interest. Here, advantage has been taken of Pyrotenax mineral insulation to lay the cables directly on to the floor's concrete screed thus making the use of trunking superfluous and consequently reducing capital cost. In this system cables with a cross sectional area of 0·0015 in. are laid 4 in. apart and comprise three single-phase circuits each of 7·2 kW and 1,272 ft in length. On laying the cables, a specially-designed tool is used which straightens the wire during the laying operation and reduces the possibility of fractured conductors. The sides of the floor are raised some 2 in. above the initial concrete level and while this raised layer of concrete is drying, semi-circular grooves are formed by a wooden mould pressed into the damp concrete at the required intervals. Retained in these grooves on each side of the floor, the heating cables are effectively secured by this economic method. Although Fig. 1 shows a metal mould being employed, it was found later that a mould constructed from wood provided a cleaner impression and would not suffer buckling. The impressions are formed just before the concrete reaches a set condition; deciding upon the correct constituency presented the only problem during the complete installation. The raised sides containing the counter-sunk cables proved to be an added convenience, enabling wheelbarrows loaded with wet concrete for covering the laid cables to travel along each side of the floor without damaging the cables. Before covering the completely wired installation with its final layer of concrete and terrazzo tiles, the floor is flooded with water and each circuit tested for continuity and insulation. Internally controlled by a floor thermostat and time switch, the installation also receives warning of external temperature variations from a Maclaren "Thermo-Time" regulator. The mains input circuit controlled by the temperature sensitive devices, consists of a 30 amp triple-pole fuse switch and a 30 amp triple-pole contactor connected to an insulated star point.

Fig. 1 top right shows the metal moulds forming the end grooves in the damp concrete. These were superseded by wooden moulds which gave a cleaner impression. Fig. 2 right : A general view of the showroom under construction and showing the floor heating elements being installed. The purpose of the moulded end grooves is clearly illustrated

Starting Split-Phase Motors

GERMAN DESIGN USES NON-INDUCTIVELY WOUND POLE SECTIONS

By KARL WILKINSON

A RECENTLY introduced split-phase motor of German manufacture uses an ingenious arrangement of the starting windings which is simple, effective and without many of the inherent weaknesses peculiar to this type of machine.

In f.h.p. motors generally, up to ½ h.p., split-phase motors are common enough and their performance is particularly good. From 1 h.p. upwards the split-phase starting tends to be replaced by the capacitor start method, or, of course, if 3-phase is available an ordinary squirrel cage motor would be used.

While the capacitor start motor is better in many ways, the extra expense of the capacitor unit is not always wanted for certain applications.

It is necessary, in the smaller split-phase motors, to have the starting windings associated with a certain resistance value in order to effect a phase shift to permit the motor to start. This is easily and cheaply obtained by winding the starting circuit with fine wire, but in doing so the current rating of the wire is extremely high, so much so indeed, that the period of starting is limited to a matter of seconds. This is the serious weakness of these motors and unless the machine starts within a short time the winding will be damaged. Moreover, repeated starting will tend to roast the fine starting windings.

In the larger type of split-phase motors, say above 1 h.p., control is usually by a face plate starter which inserts resistance in the starting winding or in some cases in the running circuit. If this resistance is incorporated in the motor itself, a method adopted by some makers, the following points must be considered:

1. The resistance must be wound non-inductively.
2. It will occupy considerable space.
3. The insulated resistance coil is expensive and entails more work for the winder.
4. The heat dissipated during the starting period will augment the temperature rise of the motor windings.

The German motor in question has reintroduced a method that was used by at least one English maker some years ago and since discontinued. That is, the starting winding is wound with a large gauge of wire and partly non-inductivity, thereby obtaining a sufficient length of wire to give the requisite ohmic value together with the necessary inductive turns.

The starting winding of this German motor is shown in Fig. 1. The wire used is ·040 in. with synthetic insulation. At first sight it would appear that the motor (a 4-pole machine) has 4 like starting poles. This is obviously impossible and the clue is given by the loops "A" left out of the winding and just visible in the complete motor.

The actual circuit is shown schematically in Fig. 2. All poles are similar, the wire being wound in two concentric coils. Starting at Z_1 we have 24 turns anti-clockwise, i.e. 8 on the inner coil and 16 on the outer. After passing through the loop A we have 32 turns clockwise on the outer and 16 turns on the inner coil. This will give 24 turns anticlockwise and 48 turns clockwise, resulting in 24 inductive turns clockwise but with the total length of 72 turns. Since each pole is similar, connecting the ends as in the diagram, will give the necessary 4 poles.

If only 24 inductive turns had been wound on each pole

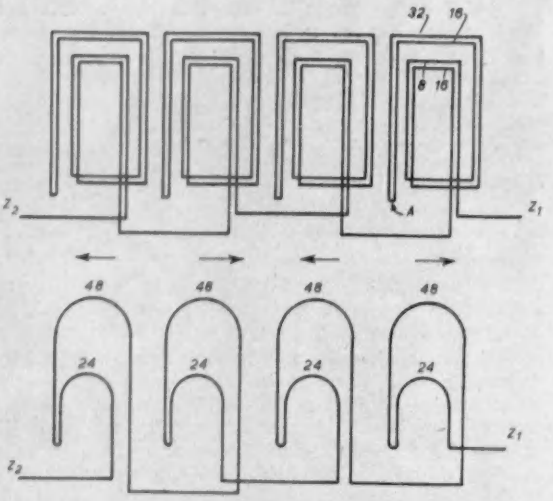


Fig. 1, top, shows the general arrangement of the starting winding. Fig. 2, lower, is the schematic arrangement of the winding

the ohms value would be approximately 0·17 per pole whereas the method adopted gives 0·5 ohms. In other words, this winding eliminates a separate internal, or external, resistance of approximately 1·3 ohms. A conventional centrifugal switch opens the starting winding in the usual manner.

Power in the Highlands

THE subject chosen for the A.S.E.E. presidential address last Tuesday was electrical power development of the North of Scotland Hydro-Electric Board. The President, Mr Bryan Donkin, now in his second term of office, suggested that a review of the constructional work and developments completed in the Highlands during the past decade, would prove to be of interest to engineers in England to whom hydro-electrification may be unfamiliar.

One of the outstanding points of Highland water power development is the range of heads available, resulting in different types of generating plant and affording experience in various site construction techniques. Natural lochs are often utilised for storage reservoirs, the levels of which are raised by mass concrete or buttress-type dams. Advantage has been taken of recent developments in prestressed concrete to construct the Lairige Dam with this material and thereby achieving a saving of 40% of the normal amount of concrete required. Included in the number of schemes considered was the Moriston Scheme, consisting of two underground stations of novel construction compared with the existing types in Scotland.

A considerable amount of work has been accomplished by the Board to safeguard salmon and trout fishing. Many conventional fish ladders are in use but the latest development is the Borland fish lift which operates on a similar principle to a canal lock. Developments and investigations in several other fields are also being promoted.

Nuclear Station Sites

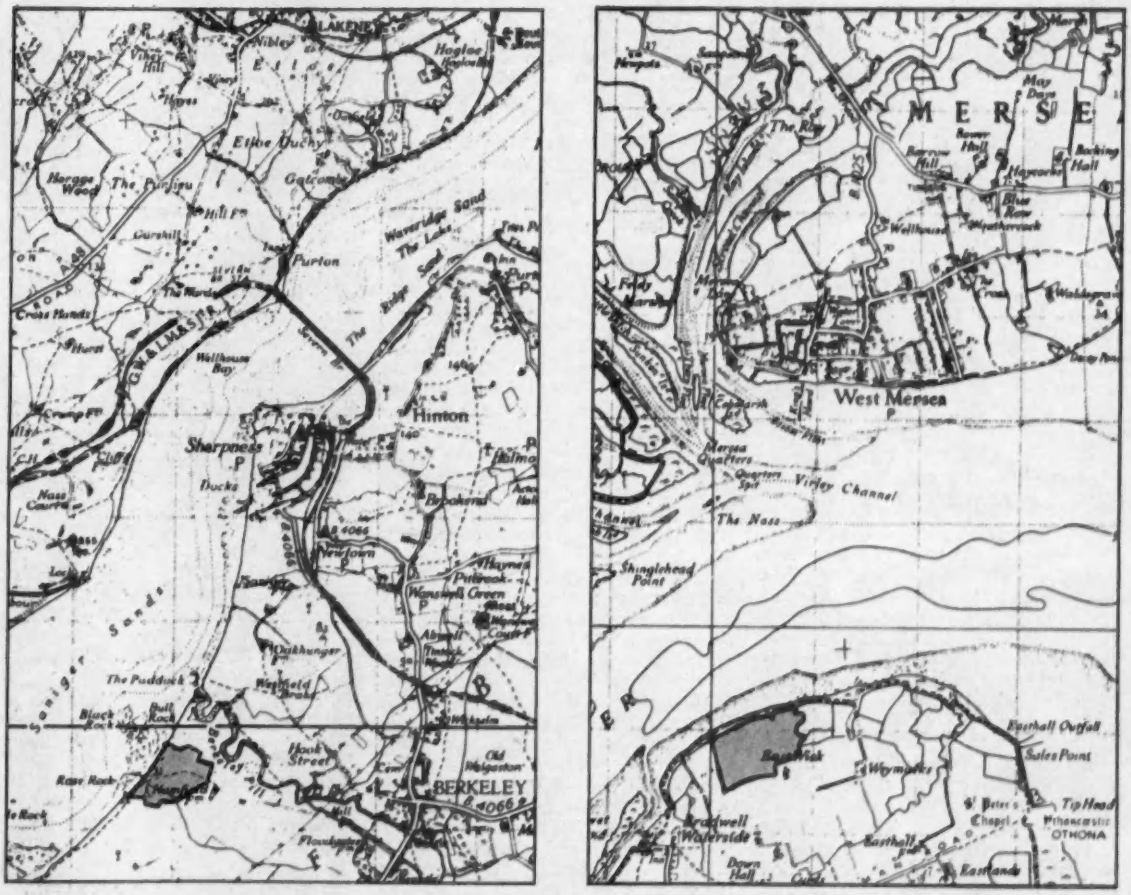
FIRST C.E.A. STATIONS LOCATED ON BLACKWATER AND SEVERN

PROPOSED sites for the first two nuclear power stations to be constructed by the Central Electricity Authority were announced last week. One is at Bradwell, at the mouth of the river Blackwater in Essex, and the other at Berkeley, on the Severn Estuary in Gloucestershire. The maps below show the exact locations of the proposed stations. It is emphasised by the C.E.A. that the choice is subject to approval by local planning authorities, and the Minister of Fuel and Power. If this permission is forthcoming promptly, construction of the stations should begin in 1957, and energy will be supplied to the Grid in 1960 or 1961.

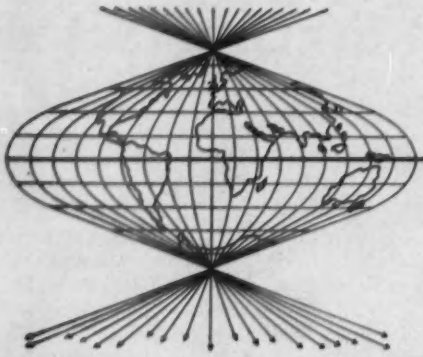
Station Design

The sites for these first stations have been selected to be well away from built-up areas. This has been considered advisable in view of the unknown factors in the operation of a nuclear power station, although these initial stations will be of an intrinsically safe construction. They will employ natural or slightly enriched uranium in a graphite-moderated, gas-cooled design, similar in principle to the stations being built by the Atomic Energy Authority at Calder Hall and elsewhere. Designs may differ considerably in detail from the Calder Hall model, however. This is because some advance in design is to be expected, and also because the Calder Hall station is primarily intended for production of plutonium, with electricity generation as a secondary object. The new C.E.A. stations will for these reasons produce two to three times the power output of Calder Hall for the same initial charge of uranium. Calder Hall is being equipped with four 23 MW alternators, but speaking at Geneva in August, Sir John Cockroft estimated its actual output to the Grid at "over 50 MW." The output of the first stations to be built by the C.E.A. was put in this same paper at about 100 MW.

Fuel elements extracted from the two proposed power stations will be transported to the A.E.A. processing factories in shielded containers to prevent any danger from radioactivity.



These maps show, left, the Gloucester site at Hamfield Farm, and right, the Essex location at East Wick



OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

Finalising Details

The Winnipeg City and Provincial agreement concerning exchange of certain power facilities in the Greater Winnipeg area is nearing completion, Ald. P. Taraska, chairman of the Public Utilities Committee, told the Winnipeg City Council recently. The delay in winding up the deal—already approved by the Manitoba Legislature and the city council—resulted from the highly-involved task facing management and technicians in arranging the transfer of properties, he said. Aimed at consolidating power distribution, the agreement provides for the City Hydro undertaking acquiring properties in the city of the former Winnipeg Electric Co., in exchange for its own facilities in the suburbs.

Acquisition

The British Columbia Power Commission has been authorised by the Provincial government to purchase the assets of the Denver Light and Power Co., and to serve that area of the Slocan Valley. A heavy storm some months ago severely damaged the area's small hydro plant, and it has been existing since on power from an emergency diesel unit. The commission will immediately transfer two portable diesel units of 50 kW capacity from its Clinton power station for installation at New Denver, to meet peak winter loads.

U.S.A.

Assistance In Development

A new concern just formed in New York—the Development and Resources Corporation—is intended to provide organisational, technical and financial guidance in the development of natural resources outside the U.S.A. The services of the Corporation will be available not only to advise and assist governmental agencies in the co-ordination of public programmes of river and land development, but also in selected private, industrial and commercial enterprises. The scope of the service will include counsel in production of energy from all sources, including nuclear energy when economically feasible. Behind the new organisation are Lazard Freres and Co., and David E. Lilienthal. The latter, who was formerly chairman of the T.V.A. and first chairman of the U.S. Atomic Energy Commission, is chairman and chief executive officer of the new company. Mr G. R. Clapp, who succeeded Mr Lilienthal as chairman of the T.V.A., has resigned as deputy administrator of New York City to become president of the new concern.

HONDURAS

Rio Lindo Scheme

Officials of the International Bank for Reconstruction recently visited Honduras in connection with proposals for the Rio Lindo hydro-electric scheme. Following this investigation, the Bank have notified the Honduras Government that before they can approve the scheme as sound further studies must be made of two important points, to which an earlier report of New York consultants gives insufficient attention. The first is the loss of water through holes in the bottom of Lake Yojoa, and the second is the route for the power transmission lines to Tegucigalpa.

AFRICA

Zanzibar Reorganisation

A report on some degree of reorganisation of the electricity supply undertaking in Zanzibar, has been made to the Legislative Council by Mr H. W. Povey, chief accountant of the Uganda Electricity Board. The Zanzibar government has accepted, in general, the recommendations, particularly those regarding the future control of the undertaking. In effect, Mr Povey largely recommends a continuation of the present set up. Generation and distribution should not be separated, and the undertaking should be operated as a whole by an electricity board rather than give local authorities the responsibility for distribution, which was a possibility previously considered. There would still be a need for overriding authority to be retained by the Government but in practice this would be limited to such things as representation on the Board and Government sanction for loans, he suggested. In his opinion, if control was vested in the Zanzibar Township Authority, there was a real danger that development outside the town would be retarded. He felt that electricity development must be extended to parts of the country where there was no prospect of immediate economic return or capital outlay. Mr Povey considered that a general increase in electricity tariffs was unthinkable unless a big increase in fuel costs necessitated it. In his view the ordinary power rate of 50c per unit was already too high. Under the Electricity Decree 1954, the Electricity Authority of Zanzibar was set up as from the beginning of this year, with exclusive rights of generation and distribution throughout the Protectorate, and with powers to authorise any local authority to operate an undertaking. Previously, the Zanzibar Government operated the undertaking.

PORTUGAL

Work in Tras-os-Montes

A recent decree grants a concession to the Companhia Hidroelectrica do Norte de Portugal to develop the use of electric power in the north eastern Province of Tras-os-Montes and in certain adjacent mountainous areas of the Minho. H.M. Consul-General, Oporto, reports that except in the neighbourhood of Villa Real, where there has been a certain development, electrification is still in the early stages in this region and is confined to low-power lighting systems in the villages. The decree encourages the concessionaire to go ahead and a subsidy is promised to help construction.

MIDDLE EAST

Aden's Expansion

A new 33 kV line from the Aden power station to Shaikh Othman and beyond to Bir Nasir—the first such line to be constructed in Southern Arabia—has now been completed. Some 16 miles in length, the line will provide increased supplies of electricity to local bore wells, thereby improving water supplies also. Aden has been fortunate in respect of its power supplies in recent years, even though the demand has rapidly increased. In the year ended 31 Mar. last, the maximum load on the power station was 4,700 kW, compared with 1,800 kW three years ago. In the same period the number of units generated has more than doubled and the number of consumers (9,439) has risen 4,000 in three years.

INDIA

Madras Scheme

The Government of Madras proposes to include in the second Five-Year Plan a Rs. 20 crores irrigation and power scheme for the Coimbatore district. The scheme, intended to irrigate 200,000 acres of land and generate 25,000 kW, will require the co-operation of the Travancore-Cochin Government. A dam is proposed to be constructed on the River Parambikulam in the Western Ghats, 70 miles from Coimbatore.

Power Survey

A load survey of power projects on an all-India basis is shortly to be undertaken by the Government's Central Water Power Commission, we learn. It is proposed to conduct the survey to ensure timely planning for the adequate provision of supplies of electricity vital for industrialisation, and to assess the amount of power likely to be required in the future. The idea is to establish regional offices which will co-ordinate the activities of the various agencies concerned with planning, electricity, agricultural and industrial departments of State Governments, large private undertakings and local bodies. Four standing committees will secure appraisals of power requirements, the possibilities and potential of various regions, and take steps for development of power and its utilisation. Standing committees would comprise the Directors of Industries of States and the Chief Electrical Engineer to the Government. Where State Electricity Boards are in existence, the Boards' representatives would replace the Chief Electrical Engineers.

NEW ZEALAND

Load Control Savings

Peak load control of water heaters by the Auckland Electric Power Board reduced bulk supply charges by about £35,000 during the quarter ended 30 June last, Mr N. M. Speer, general manager of the Board, has stated. Operations for the period resulted in a surplus of £3,491, but without peak load control there would have been a deficit of £31,000, he said. Although the Board purchased 5·8% more units than in the same quarter last year, the cost was only 0·5% higher. Units sold for domestic supply in the quarter rose by 7·7%, and for commercial purposes by 5·3%.

Next for North Island

Construction of the 84 MW Ohakuri hydro-electric power station, the seventh on the Waikato River, New Zealand, is likely to commence before the end of the year, Mr Goosman, Minister in charge of the State Hydro-Electric Department, has said. Investigations had been completed, and as soon as labour became available a start would be made. The dam is to be constructed in a narrow gorge about five miles up stream of Atiamuri. It is expected it will have an earth centre section and two low concrete wings. From one of these wings, on the best bank of the river, three penstocks will take the lake water from a forebay down into a power house on the bank of the river. The first two generating sets at Ohakuri are scheduled for operation in April 1961, and the third machine six months later.

No Cook Strait Cable?

The N.Z. Minister of Works, Mr Goosman, has no confidence in the proposal for a cable across Cook Strait to transmit power from the South Island to North Island, but there is to be a thorough investigation, nevertheless. In the House of Representatives recently, he said he did not think the Government would be justified in such experiments, at a cost of millions, until it was sure it could be done. But he emphasised that efforts would be made to concentrate on plans for providing additional power in North Island. With Roxburgh due to operate next year, and Benmore, the South Island's supply would be ensured for the next 20 years. The Government's plans for North Island include Whakamaru, Atiamuri, Waipapa, Ohakuri, Wairakei and the Mercer coal station.

AUSTRALIA

New Showroom

The General Electric Co., Ltd., of England, has opened a new warehouse and showroom at Launceston to expand its activities in Tasmania. The building, which cost over £50,000, comprises three floors, but more can be added if required. The formal opening was performed by the State Premier, Mr Cosgrove.

Cheap Power Or . . .

Unless the Commonwealth aluminium project at Bell Bay, Tasmania, could get cheaper electric power, it would be a burden on the Australian people, the Minister for Supply, Mr H. Beale, has stated. If the project had to meet electricity charges higher than those in other parts of the world it would be impossible for it to produce ingots at a competitive price, he went on. Talks with the Hydro-Electric Commission of Tasmania would continue to try to work out a formula for a reasonable electricity rate, and he hoped a satisfactory agreement would be reached to enable the project to operate at a profit. The Bell Bay aluminium project could produce a maximum of 13,000 tons a year but output would be only 6,000 tons this year and somewhat more next year.

FAR EAST

Island's Supply

A proposal to supply Lantao Island by submarine cable from Hong Kong has been put forward by the China Light and Power Co. At present electricity is being supplied on the island by a small company, and by individual generating plant. The new scheme, which would cost about $1m, is expected to take nearly nine months to complete.

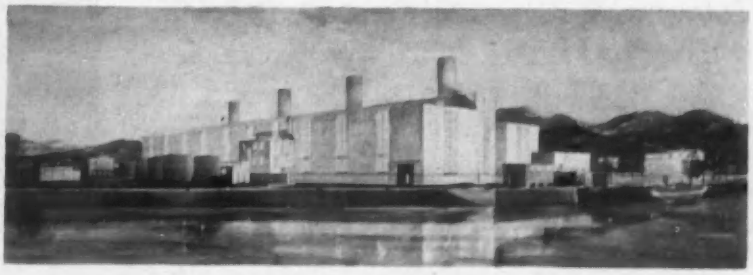
Traction Experiments

Experiments are now being carried out by the Japanese National Railways with electric locomotives operating on alternating current. At the present time the locos in use have been the d.c. type. Two of the a.c. locos have now been delivered to the National Railways. The first, to operate direct on 20 kV a.c., has been built by Hitachi Ltd., and is capable of handling 280 tons. The other locomotive, which utilises a mercury arc rectifier, has been supplied by the Shir Mitsubishi Heavy Industry Co. The Japanese National Railways opened up negotiations with a French concern for the purchase of a.c. locomotives, but no final arrangement has yet been reached "because of the high prices quoted."

H.E. and Irrigation Scheme

An increase of 210 million units a year in output of hydro-electric power in the Aichi Prefecture (Nagoya area) is one of the aims of the Aichi Irrigation Public Corporation Bill which was recently passed by the Japanese Diet. The particular area in mind is the Chiba peninsular, where it is proposed to construct a dam on the upper reaches of the Miso River, and build a 120 km long irrigation canal. Cost of the project is estimated at 31,500 million yen. It is to be financed by loans from the International Bank, Government subsidies, etc.

Illustrated below is an artist's impression of the new North Point "B" power station being built for the Hong Kong Electric Co., Ltd. The contract for the station was placed a short while ago with the English Electric Co., Ltd., the whole of the civil constructional work being carried out by George Wimpey and Co., Ltd. The station is designed for an ultimate capacity of 180 MW. Under the present contract the English Electric Co., are to supply one 30 MW turbo-alternator, together with the associated switchgear, transformers, etc. Boiler plant is being supplied by Babcock and Wilcox Ltd.



Personalities

IN THE INDUSTRY

Mr S. L. M. Barlow, A.M.I.E.E, M.AMER. I.E.E., has been appointed a non-executive member of the Board of the Wolverhampton firm of Electric Construction Co., Ltd., as from 13 Oct. it has been announced. Mr Barlow is a leading personality in the contracting industry, having been president of the Electrical Contractors' Association during 1953-54. He joined the E.C.A. in 1940 and since then has served in official capacities in the London Branch, on the London and Home Counties Sectional Board, and on the Council. Mr Barlow has been managing director of Barlow and Young Ltd. since 1933, and is also a director of Troughton and Young Ltd. During the war he was assistant electrical engineer at H.M. Dockyard at Rosyth, and hon. assessor at the Ministry of Labour Board of Appeal. Mr Barlow is a member of the I.E.E. Council.

After over 33 years at Newport (Mon) power station in the S. Wales Div. of the C.E.A., **Mr J. Ellis,** A.M.I.E.E., the station superintendent, is to retire in January. Mr Ellis went to Newport in 1922 as shift charge engineer, and was promoted successively to deputy superintendent in the mid-1930's, and to superintendent during the war. He carried on in the same position with the C.E.A. when the supply industry was nationalised in 1948. In the early days of his career, Mr Ellis was with the Watford and Wimbledon supply undertakings before joining the armed services during the 1914-18 war. On demobilisation he spent some three years with a Middlesbrough steelmakers, subsequently taken over by Dorman and Long Ltd. The absence of Mr Ellis from his post at the power station will be badly felt, but he will also be missed on the social side. Mr Ellis is chairman of the social club in Newport, run for the employees of the Division and Area Board.

Newly elected President of the Purchasing Officers' Association for 1955-56 is **Mr H. W. King,** purchasing director of Eburite Corrugated Containers Ltd. He joined the company at the age of 20 and took over control of purchasing in 1932, becoming a director in 1948. His election is particularly notable, because as the Association's hon. secretary he played a major role in the reorganisation some 11 years ago, building up the membership from a mere 500 to some 4,000 at present. Executive vice-president for the coming session is **Mr R. J. Mitchell** of Morgan Crucible Co., Ltd., and among the five vice-presidents (U.K.) are **Mr J. Ferguson** of Chloride Batteries Ltd., **Mr O. A. Pallett** of the British Thomson-Houston Co., Ltd., and **Mr C. L. Wright** of the Westinghouse Brake and Signal Co. Ltd.

The appointment has been announced of **Mr A. T. Thorley** as director of Wilkins and Mitchell Ltd., makers of the Servis washing machines, refrigerators and rotary ironers. Mr Thorley has been with the company since 1934 when he assumed responsibility for sales and service development in Lancashire and the North-West. Three years later he became assistant sales manager of the organisation, rising to sales manager a year later.

On the outbreak of war, he joined the Army, serving with the R.A.S.C. for six years, and returning to the company on demobilisation. In the immediate post-war years, the late Mr C. A. Barker, who was then in charge of Servis sales began developing markets, both at home and overseas. This task was entrusted to Mr Thorley. In 1947 he took up the position of commercial manager for the N. of England and Scotland, a new post created to co-ordinate the function of sales, service and publicity departments. He held this position until 1950, except for a short period in 1948, when with Mr Tom Barker, he spent some months in Brussels, opening up the market there. He was then promoted to general sales manager and transferred to Darlaston.

Radio and Allied Industries Ltd. have announced the appointment of **Mr Bentley Jones** to the Board. Mr Jones has resigned from the Board of Thorn Electrical Industries Ltd., where he was responsible for the Ferguson Div. sales in this country. Radio and Allied Industries are specialising in the production of large-sized screen television sets at competitive prices, and the announcement of Mr Jones' appointment includes the statement that "the appointment foreshadows the further expansion of the company." Mr Jones is 49, and has spent some 28 years in the radio industry. He resigned from the position of sales manager of E. K. Cole Ltd.'s radio division in Oct., 1950, to take up a post as commercial director with Ferguson Television and Radio Div. of Thorn Electrical.

Two new appointments have been made to the Midlands Electricity Consultative Council. Newcomers nominated by the Minister of Fuel and Power, are **Mr P. McNab Miln,** B.SC., A.M.I.MECH.E., A.M.I.E.E., and **Clr F. E. Huckfield.** Four members of the Council have recently ceased membership.

Succeeding Mr W. F. Smith, who died suddenly last month, as works accountant at Johnson and Phillips Ltd. is **Mr J. E. Tibbatts.** For many years Mr Tibbatts was Mr Smith's deputy, and has served with the company on the costing and accountancy side for over 31 years.

Newly appointed commercial manager of F. Perkins (Canada) Ltd., Toronto, the Canadian subsidiary of the Peterborough firm of diesel engine manufacturers, is **Mr P. Alliston.** He was formerly acting general manager of Perkins' Australian company.

New President of the British Engineers' Association is **Mr W. K. G. Allen,** M.I.MAR.E., A.M.I.N.A. Officers for the ensuing session were elected last Thursday. Mr Allen is chairman and joint managing director of W. H. Allen, Sons and Co., Ltd. Elected at the same time as vice-president, was **Mr E. W. Thompson,** M.A., J.P., who is chairman and a managing director of John Thompson Ltd. The retiring president, **Mr H. S. Dick Broom,** M.B.E., B.SC., M.I.MECH.E., joint managing director of Broom and Wade Ltd., has been elected hon. treasurer.

Mr S. L. M. Barlow

Mr H. W. King

Mr Bentley Jones

At the 58th annual meeting of the Nottingham Society of Engineers last week, **Mr M. Wadeson,** M.I.E.E., delivered his presidential address. Mr Wadson is manager of the Nottingham sub-area of the E. Midlands Electricity Board, assuming that position on nationalisation. Previously he was with the local electricity undertaking as deputy city electrical engineer from 1939, and as city electrical engineer and general manager from 1946. Joint consultation in industry was the subject of Mr Wadeson's address.

Sir James Reid Young has been appointed deputy chairman of International Combustion (Holdings). He is chairman of Fescol and vice-chairman of James Booth and Co., and also on the boards of several companies including Vickers Ltd.

En route for New York, **Sir John Cockcroft,** director of the Atomic Energy Research Estab. at Harwell, left London Airport last week. He was on his way to address a conference of American businessmen on the uses of nuclear energy in industry, and later to meet Canadian scientists.

Mr E. R. Robins, F.R.S.A., M.S.I.A., N.R.D., chief designer to the Lighting Div. of Philips Electrical Ltd., has been elected a Fellow of the International Institute of Arts and Letters. Fellowship of this select Society is restricted to a total of no more than 160, and includes artists, designers and men of letters from Britain and other countries, including Argentina, Belgium, Canada, France, Greece, Luxembourg, New Zealand, Spain, Switzerland and the U.S. The Society has its headquarters at Lindau-Bodonsee in Germany.

Mr F. J. Pascoe, (extreme left) new chairman of Aberdare Cables (Holdings), with Mr J. P. Gilliver and Mr A. J. Nicholas, newly appointed joint managing directors, viewing one of the new 33 kV metalclad switchgear units at the company's Blackwood factory. Lt Col Peter Dollar, director of Aberdare Cables (Holdings) is on the right. Mr Pascoe is also chairman and managing director of British Timken and a well known figure in British sports circles. He is one of the main supporters of the Northampton Cricket Club and a number of famous cricketers are members of the British Timken organisation

Mr W. Tomlin has resigned from the board of the W. Drayton, Middlesex, firm of Power Plant Co., Ltd.

OBITUARY

Mr Frank W. Shilstone, who has been on the staff of Kennedy and Donkin, consulting engineers, since 1919, died suddenly at his home last week. He was 63. His 36 years with the consultants was broken only by a short period between 1935 and 1940.

NEW LITERATURE

Electrical Contractors' Year Book

AGAIN brought up to date, even to the extent of including amendment slips to the new edition of the Fair Trading Policy, the 1955/56 edition of this year book differs but little in style to its predecessor. The members of the E.C.A. are set out in their respective Association Sections, in addition to an alphabetical list. Further, to assist readers who may wish to find an E.C.A. member in a specific locality, a list of places is given with a cross reference to the branches concerned. With all the other information, such as rates of pay, notes on the law for electrical contractors, and particulars of the N.J.I.C. agreements, this is an extremely useful volume which all who have dealings with the contracting industry should possess. Published by the Electrical Contractors Association, 763 pages, 7¼ in. by 4½ in. Price 20s.

Electric Transmission and Distribution

Edited by B. G. Skrotzki.

IT is the ambitious intention of this book to present to the non-technical but well-educated reader a survey of transmission and distribution practice in America. One imagines that it will be rather hard going for the genuinely non-technical student, but for the British engineer the descriptive parts of the book, which make up its greater part, do give a useful review of U.S. methods in this branch of electrical engineering, while avoiding the indefiniteness of expression too often found in technical books having a popular leaning. The first chapter starts with the fluid theory of electricity, and the fact that at the end of 75 pages it is dealing with the polarity of transformers connected in parallel well suggests the pace that is set throughout the book. Subsequent chapters, each contributed by an engineer practising in the field concerned, deal with transmission substations and apparatus, lines and cables, and with various aspects of distribution systems, including protection. A brief review of street lighting principles is then given, and there is a consideration of planning and load characteristics, and a description of distribution system auxiliary apparatus. For all its faults of trying to do too much, this book includes a great amount of interesting and useful information succintly presented. Published by McGraw-Hill, 448 pages, 9 in. x 6 in. Price 56s. 6d.

Radar and Electronic Navigation

by G. J. Sonnenberg

A MEASURE of the rapid development of new radar techniques and other electronic aids to navigation can be obtained from this revised and enlarged edition. A new chapter on the direction finder has been added and includes such refinements as the visual bearing indicator and air radio beacons. Existing chapters relating to other radio-location systems have been revised to include the latest developments which are described with the aid of suitable diagrams and photographs. The three radiolocation systems at present employed by nearly all the countries of Europe are explained separately with numerical examples and radio navigation charts to facilitate comprehension of the particular apparatus and techniques. A substantial chapter has been devoted to the theory of radar, the basic principles of which are concisely delivered in a manner for clear understanding. Photographs and diagrams not only help to explain these principles to the navigator but also show exactly what he may expect to see on the indicator of his apparatus. Throughout, emphasis has been placed on those factors of operation and interpretation which are of practical use and importance to the navigator. Second edition, published by Newnes, 288 pages, 8½ in. by 5½ in. Price 31s. 6d.

BOOKS RECEIVED

Television Receiver Servicing, Vol. 2, by E. A. W. Spreadbury. This section of a comprehensive work for radio service engineers deals with all sections of the receiver apart from time-bases and their associated circuits (covered in Vol. 1). Published for *Wireless and Electrical Trader,* by Iliffe and Sons, 308 pages, 8½ in. by 5½ in. Price 21s.

Equipment for Industry

Controlling Emergency Lighting Systems

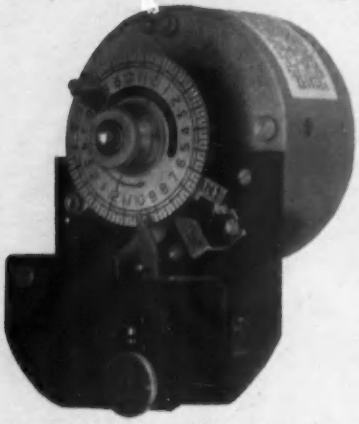
FORTUNATELY mains failure does not occur often but to safeguard against such a contingency many industrial concerns employ standby emergency lighting equipment. One of the major manufacturers of emergency lighting apparatus and batteries, NIFE BATTERIES, Redditch, Worcestershire, have added a new control unit to their range of equipment ensuring maximum efficiency and reliability for their emergency systems.

Accommodated in a smoothly contoured steel cabinet, the unit's meters and fuses are clearly indicated and accessible on a sloping front panel. The contactor, an important component in any emergency lighting control apparatus, has been designed to function in silence and without vibration. Operation of the spring-loaded contact in a positive manner and within close voltage limits, has been achieved by means of an automatic control device incorporating an auxiliary relay. Set so that it will not close until the mains voltage reaches a higher value than required for positive closure of the contactor, the relay also eliminates damage to the contactor and its associated auxiliary mains rectifier. In addition to the remaining necessary components the cabinet also contains a double wound transformer with tapped primary and full wave bridge connected selenium rectifier for recharging an exhausted battery in 14 hours. Another version of this control equipment includes an additional transformer to feed emergency lights at a reduced voltage from the a.c. supply.

Nife Batteries' new control cubicle for emergency lighting equipment

Familiar Time Switch re-designed

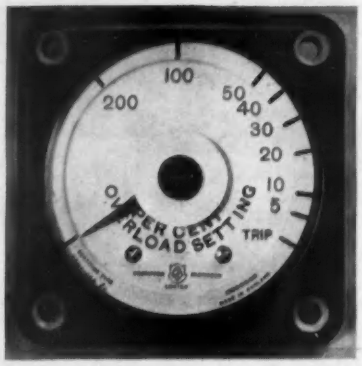
AFTER proved usage for more than a quarter of a century, the familiar 15-day hand-wound time switch type B.F.43 manufactured by VENNER LTD., Kingston By-Pass, New Malden, Surrey, has been re-designed. Larger contacts incorporating a magnetic arc disrupter provide an increased capacity up to 10 amp, 250 V a.c. or d.c. compared with the original version's rating of 5 amp. The new model, type B.F.55 retains the same overall dimensions as the earlier model and therefore may be fitted into existing B.F.43 boxes. This improved switch, complete in a cast metal case, may be obtained at the same price as the previous version and employed in similar situations with the advantage of the higher rating.



This re-designed time switch incorporates larger contacts with a magnetic arc disrupter

New Overload Contact Making Ammeter

AN inexpensive device which affords reliable overload protection for electrically driven machines, has been recently developed by CROMPTON PARKINSON LTD., Aldwych, W.C.2. Basically, the device consists of a sensitive ammeter provided with a pair of contacts that close at full scale deflection, thus an external relay may be actuated to operate a warning or cut-out system. In addition, the instrument may be supplied with a dial calibrated in "percentage overload setting" providing a visual indication of the overload causing the contacts to close. On installation, the device is connected to the secondary winding of a variable ratio current transformer, the primary of which being series connected to the machine's mains supply. Hand adjustment of the variable transformer sets the ammeter to the appropriate overload value, thus avoiding the use of an adjustable contact within the instrument. Machine shop conditions obviously have been considered since this sensible adjustment method avoids setting the delicate mechanism of the ammeter, the relatively sturdy transformer catering for any necessary setting. By locating the instrument's fixed contact at a point corresponding to full scale deflection, the complete range of the ammeter has been utilised and maximum accuracy ensured.



Crompton Parkinson's new ammeter may be utilised as an overload protection device

Flexible Electric Heated Jackets

ELECTRICALLY heated mantles for laboratory apparatus and small specialised plant have been available for a number of years, but recently ISOPAD LTD., 30-32 Rosemont Rd, N.W.3, have extended their range of electrically heated jackets to cater for practically any size of cylindrical industrial vessel. These jackets are made in two sections which may be either hinged or bolted together and comprise a heated panel backed by glass wool lagging and enclosed by cylindrical sheet metal casings. Standard appliances, or "Isojackets" as these latest additions to the electric mantle heating range are designated, may be employed in situations requiring temperatures up to 400° C, whilst quartz cloth jackets are available for high temperature work up to 800° C. For use in flameproof areas, a special metal sheathed, mineral insulated type of heating element is provided and led into flameproof terminal boxes. Normal loadings are from 150 to 700 W per sq ft and units are readily available in sizes between 1 ft and 5 ft in length and 1 in. to 48 in. diameter, other sizes the manufacturers state, may be made to measure.

B.C.E.'s new Infini-Angle Lamp

DESIGNED for workshops, laboratories and drawing offices, the new and unique patented lighting unit introduced by the BRITISH CENTRAL ELECTRICAL CO., LTD., 6 and 8 Rosebery Ave, E.C.1, is assembled with slip-ring connections at all joints, thus allowing complete rotation in any plane. The unit comprises four basic parts all painted in "Vespa Green." First is the pedestal on which it is mounted, secondly a coupling piece with slip-rings in two

B.C.E.'s new unit turns in any direction

planes. Third comes one or more arms, according to the length required and lastly the reflector and lampholder. Unbreakable perspex visors, to protect the lamp and reflector from dirt or damage can be supplied clear, opal or coloured. The fitting itself can be screwed directly to bench top or wall or can be mounted on a ¾ in. E.T. tapped conduit box, a clamp base (for benches, work tables, desks, etc.) opening up 2½ in. thickness and a drawing board bracket.

The slip-rings at each joint are tested up to 2 kW at 230 V and are also suitable for l.v. supplies. Wiring between these slip-rings is internal and permanent. Prices: £3. 15s. net trade for the complete unit with one arm and b.c. lampholder and £4. 11s. 6d. net trade for two arm unit. Also available with e.s. lampholder. The unit is fitted with d.p. switch in pedestal but a s.p. switch can be fitted to lampholder assembly in lieu at no extra cost.

1955-6 Belling Catalogue

NEW contemporary-styled convector heater, the "Zephyr," appears in the new season's catalogue of BELLING AND CO., LTD., Bridge Works, Enfield, Middx. This new model which is available in wall mounting and free standing versions is expected to be available early in the New Year.

MK Prices Down

NEW 1956 Catalogue of M. K. ELECTRIC LTD., Wakefield St, N.18, is now available. As well as introducing a number of new lines it contains the announcement of important price reductions affecting two of the most popular M.K. lines — their recently-introduced Plateswitch and the 13 amp range of socket-outlets, switch-socket-outlets and fused-plugs. These are the accessories mostly needed for new housing work. The lower prices are made possible by greatly increased output from the firm's enlarged Park Rd factory, and they will make a substantial contribution towards reducing installation costs.

New Osram Decoration Set

KNOWN as the Osram "Star and Candle" set a new decoration lighting set now available from the GENERAL ELECTRIC CO., LTD., Magnet Hse, Kingsway, W.C.2, comprises six coloured plastic stars and 6 coloured plastic candles, all illuminated by 20 V, 3 W lamps connected in series. The stars are illuminated from within by small clear lamps and the candles are each fitted with a coloured bulb which represents the candle flame.

This new Osram set is supplied complete with 2 spare lamps, beads for fixing and a b.c. adaptor. The price including tax is £1. 19s. 6d.

"Star and Candles" form attractive illumination for festive occasions

This season again sees the "Standard" set selling at £1, the "Party Light" set at £1. 9s. 8d., and the Osram large bulb set which is now reduced in price from £1. 19s. 6d. to £1. 13s. 6d. (inc. p. tax).

Utility Heater 2 Sizes Now

THE inset convector included in the range of UNITY HEATING LTD., Chilworth Manor, Southampton, is now available in two alternative loadings, 1 kW or 2 kW and in two alternative finishes, Bronze or Silver Grey Hammer Enamel.

The prices are model 1951, (1 kW) £14. 10s. plus £5. 5s. 10d. tax, model 1952 (2 kW) £15. 5s. plus £5. 11s. 4d. tax.

More "New-Range" Lighting from Cromptons

THE "New-Range" of fluorescent lighting fittings introduced twelve months ago by CROMPTON PARKINSON LTD., Crompton Hse, Aldwych, W.C.2, has now been exended to include 4 ft, 3 ft, and 2 ft sizes. At the same time a new patented lampholder is used and a number of commercial fitting designs introduced with "New-Range" features.

This new patented bi-pin holder of

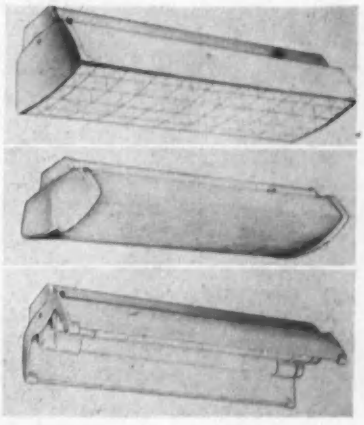
For the Electrical Trade

robust construction enables all the shorter lamps to be fitted and removed with no twisting action for locking. Perfect contact is ensured by independent pressure on the lamp pins and lamp endshields are provided to eliminate end flicker.

The commercial fittings have been developed with all the virtues of simple installation and maintenance associated with the existing "New-Range" fittings, and are available in 2 ft twin lamp 20 or 40 W size up to 5 ft 80 W sizes, so that the total of 150 lamps for switch or snap start now available should meet any lighting need.

"Permawhite" top-quality finish of all enamelled parts has now been standardised at no extra cost to ensure no deterioration of colour or rust.

Particularly useful features of the equipment are the infinitely variable suspension centres and adaptability of fixing to all wiring systems, along with complete reflector, diffuser or louvre removal without disturbance of lamps, thus facilitating thorough cleaning at floor level, safely and quickly.



Examples from the new range. Top to bottom are the DTL 21. A closed end louvered "Perspex" fitting. DR 21. A totally enclosed commercial fitting, and DX 21, an open-end open-top metal reflector. All for 20 w. 7 ft. tubes

"Quik" Release Lighting Unit Aids Maintenance Works

NEW line introduced by CABLE STRIPPERS LTD., Leighton Hse, Potters Bar, Middx., the "Quik" release lighting unit has been designed to assist the easy removal of complete lighting units thus aiding maintenance work in busy factory shops without interfering in any way with output.

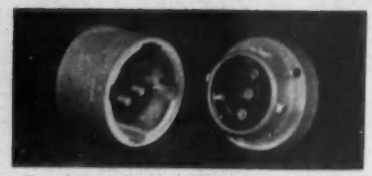
The unit is a two-piece gravity casting of robust alloy employing two line, 1 neutral contact, one piece being affixed to the ceiling or other upper section thus providing a strong anchorage for the second piece which has a bayonet type of action when placed in position. Two strong lugs on the fixed piece give the bayonet a snap action against three spring-loaded contacts. Safety lugs incorporated in the design of the castings ensure complete safety and may be used for anti-theft prevention. Basic cost is 25s. and there are various adaptor plates. A similar design for application to standard fluorescent fittings cost 46s. 8d.

TRADE PUBLICATIONS

LIGHTING.—New pocket size loose leaf lighting catalogue has been issued by Scemco Ltd., 6 Soho St, W.1.

TRANSFORMER AND SWITCHGEAR.—Foster Transformers Ltd., South Wimbledon, S.W.19, have issued new editions of catalogue sections as under Section 4.VR List 4210, 4300, 4305, Sec. 1 Trans. List 1325/7 pp. 1 and 2, Section Misc. List No. 0150, p. 1, and a folding booklet List FM17 describing Foster Test equipment.

HEATING ELEMENTS.—New List MYN/1 just issued by Metway Electrical Industries Ltd., Canning St, Kemp Town, Brighton 7, is a veritable reference book of spare parts for it includes a very large range of "bits and pieces" essential to the repairer of domestic appliances for all makes of appliances whether the firms are now in business or long non-existent and for those appliances for which the manufacturers no longer hold stocks.



"The Basic 'Quik' Lighting unit is in two parts", fitting together with bayonet action

DOMESTIC APPLIANCES.—New edition of the "off the shelf service" catalogue of Sloan Electrical Co., Ltd., 31-33 Bondway, Vauxhall, S.W.8, is now available. Always a clearly illustrated and detailed list, this new edition could easily claim to be the most comprehensive of its type available.

DOMESTIC APPLIANCES.—L. G. Hawkins and Co., Ltd., 30 Drury Lane, W.C.2, have published their new and most attractive catalogue which includes large clear illustrations of the appliances, together with all the information which can reasonably be expected by dealers set out clearly and concisely.

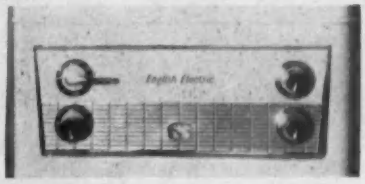
SWITCHES.—New Catalogue No. 129 describes the firm's range of switches and operative 1 July for the products of Arcolectric (Switches) Ltd., Central Av, West Molesey, Surrey.

Two new washing machines from English Electric

THE introduction of two new washing machines of similar capacity and dimensions, one having an immersion heater and one with no heating element, has been announced by THE ENGLISH ELECTRIC CO., LTD., Queen's Hse, Kingsway, W.C.2. Design features include streamlining of cabinets to combine with fitted kitchen units; a storage compartment for the detachable wringer; controls mounted at waist height on the front panel; whilst the noise-level of the appliances in operation has been notably reduced.

The two new English Electric washing machines, models 4004 and 4005 (with 3 kW immersion heater), have a capacity of 10 gallons of water and a 8-9 lb dry weight load of clothing. The cabinets are made of sheet steel specially treated against rust and finished in cream or white stoved enamel as in the English Electric appliance range, whilst the interior of the tub is finished in hard-wearing vitreous enamel. The washing machines are easily moved as they are mounted on ball-bearing castors. Size of the cabinet is 36 in. high by 21¼ in. wide and 23¼ in. deep. The wringer may be stowed in the base of the cabinet, and a separate table top cover is available. Each type of washer has a 12 in. long power wringer, an automatic draining pump which empties 10 gallons in 3¼ minutes, and an automatic overload device.

A remarkable feature of the design is a new type of draining pump. Instead of running as soon as the motor is connected, the pump remains idle until it is brought into operation independently by withdrawing the pump lever. As a result, these new washing machines run very quietly indeed.



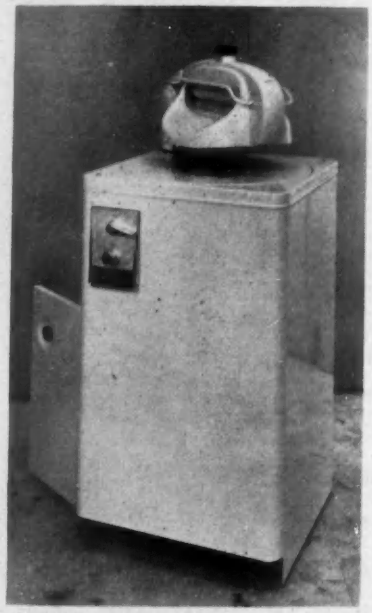
The stylish fascia panel of the 4005 (seen above) includes the on/off switch for the motor, the element switch, pump and agitator controls

The washing action is by central agitator set in motion by an on/off lever which allows maximum control of washing times to suit the varying types of fabric in each load. This agitator is of a special heat-resisting plastic which has been extensively tested and developed for use at high temperatures.

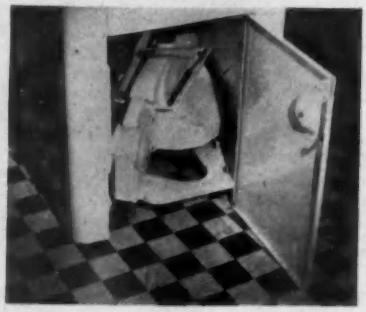
A powered wringer is fitted with 12 in. rubber rollers of 2 in. diameter, on which the pressure may be adjusted for flimsies or the heaviest blankets. As an extra protection against wear, nylon inserts are used for the top roller bearings, and tallow-impregnated wood for the lower bearings. The wringer may be moved to eight radial positions from the tub. A safety bar releases the rollers instantly to upward or downward pressure.

A rotary ironer attachment is available for both of the new washing machines, and fits in the wringer socket.

Prices: Model 4004, £52, plus £19 tax. Model 4005, £61. 17s., plus £22. 13s. tax.



The 4004 is the non-heated version and a smaller control panel houses only the pump and agitator controls. The accommodation for stowing the wringer is clearly seen below



PROBLEMS AND PRACTICE

In Engineering

Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

D.C. Motor Troubles

LAST December a 400 V d.c. four-pole compound wound motor driving a sausage making machine burnt out and was completely rewound by a local firm. Early in the New Year complaints were made that the motor overheated and a load test found nearly three times the normal full load current was being drawn from the line. The usual tests were made on site and an insulation test with a 500 V instrument proved satisfactory. No defect could be found but overloading was suspected, and instructions were given to the machine operators to avoid using too stiff a mix and not to overfill.

During August I received an urgent 'phone call stating that the motor had blown a fuse, the fuse had been replaced and had blown again as soon as the motor was restarted but instead of stopping continued to run at a reduced speed. It was obvious that either the motor, starter or wiring was finding an earth return, the supply being a 200/400 V three wire system. The trouble was traced to a dead short between shunt and series fields and both had blown down to earth. The faulty field was located and removed for examination. No dampness was present and the cause of the breakdown could not be ascertained, further testing found one short-circuited coil on the armature.

Once again the motor was rewound completely, those concerned with d.c. plant will fully appreciate the costs of d.c. motor rewinds. On making enquiries it appears that the rewind firm had no h.v. testing equipment, and I wonder if the motor had been "flash tested" after the December rewind would the impending field breakdown have been discovered? Further, had a 1,000 V insulation tester been used when complaints were first received would this have prevented a complete rewind in August? I have my own opinions but am afraid this breakdown must pass as "Cause Unknown."—*"Surveyor."*

Machining Hexagons

EXTENSIONS are often needed for increasing the effective length of tubular box spanners so that remotely-placed nuts and bolt-heads can be reached. The extension normally consists of a piece of cylindrical rod with a male hexagon machined on one end for fitting into one end of the tubular spanner. The hexagon on the extension should be a reasonably close fit so that it stays in engagement with the hole in the spanner.

It is difficult to file an accurate hexagon on the end of a rod and setting up a milling machine for doing the job is not usually worth the trouble and time. A simple method of machining hexagons with accurately-spaced flats is as follows.

The extension rod can be made from a scrap high-tensile steel bolt with an outside diameter equal to that of the box spanner. A nut is fitted on the thread of the bolt and should be a fairly tight fit so that it will not turn on the thread with normal handling. If an ordinary nut which is sufficiently tight cannot be obtained, then one of the new lock nuts with a fibre or nylon insert can be used. An alternative is to saw through the wall of a common nut and to squeeze it on to the bolt.

The flats of the hexagon can be ground on the end of the bolt by the method shown in the illustration. The nut bears on the grinding wheel rest with one of its flats in contact therewith and the bolt end is presented to the side face of the revolving grinding wheel. If the bolt is turned so that the nut flats bear on the wheel rest in succession, a series of equally-spaced flats will be ground on the end.

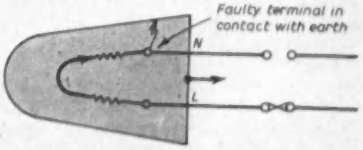
The use of a nut on a h.t. steel bolt facilitates the grinding of hexagons for box spanner extensions

The successive cuts of the grinding wheel should be light so that the width of the flats can be closely controlled. It is fairly easy to rough out the hexagon to size by watching the grooves in the thread, which become progressively narrower as metal is ground away from them. When final size is approached, it is better to give the hexagon a slight taper from front to back and then to try the small end for size in the socket wrench as grinding continues. When the hexagon will enter for half its length, grinding can cease and the extension driven lightly into the hexagon hole in the wrench; the two will then be firmly secured together, but can be separated easily, if necessary.

If the bolt used to make the extension has a hexagon head, this can be used for turning with another wrench. If space is restricted and the large bolt head would get in the way of things, it can be sawn off and a cross hole drilled for a suitable "tommy bar" which can be used for turning.—*C. T. Bower.*

Faulty Socket

WHEN "N.S." discovered the reversed polarity in the faulty switch-socket controlling the electric iron, he might have also driven the point home that if a fuse had blown in the neutral lead the earth would act as a return for the fortuitous current. In which case any loose connection in the earth circuit would lead to overheating and the possibility of fire by stray earth currents. A blown fuse in the neutral brings the additional hazard, particularly with the open elements of an electric fire; with the fire switched on it would not heat yet full voltage would exist between the element and earthed frame. It thus proves the case for single pole fusing with a solid neutral which eliminates the possibility of these dangers.—*M. N.*



Showing how with blown neutral fuse the earth acts as a return for the stray current

S.P. Circuits

ON reading R. A.'s contribution under this heading, I find myself in support of Mr Snelson. R. A., strictly speaking, is degrading the craftsman, as the circumstances he describes are practically non-existent today. If and when they do occur, the matter is dealt with accordingly when the meter and entout for use on a.c., which R. A. considers are connected. Of s.p., switch fuse units inadequate, this may be so where the "handyman" is concerned, but for craftsmen it fulfils its obligations quite satisfactorily and is used only where this is the case. Mistakes and careless connections are not a general practice of the craftsmen but a "silent" failure of the "handyman".—*J. H. R.*

NEWS OF THE WEEK

H.P. Statistics to be Collated

Board of Trade ask 6,000 Retailers for Sales Details

FOR SOME time now, there has been a wide gap in available trade statistics by the absence of any official figures on hire-purchase dealings. Hire purchase has become such an important factor in sales and trading, that some reliable statistics are now essential. It is thus good news that the Board of Trade have undertaken to supply this need. Mr Peter Thorneycroft, President of the Board of Trade, yesterday despatched letters to 6,000 retailers all over the country in trades where important sales of goods on H.P. terms are made, inviting them to provide monthly information. Prominent among those concerned are retailers of radio and TV sets, domestic appliances and furniture. Retailers receiving these letters have not been asked to contribute monthly statistics to the B.o.T. before. In addition, department and multiple stores, co-operative societies and nationalised undertakings, who are already sending monthly figures of their total retail trade to the B.o.T. are being asked to supplement their information with details of H.P. business. Because many retailers pass H.P. agreements over to finance houses, over 450 such bodies are also being invited to contribute to the overall scheme. Anyone who has not received an invitation to contribute to these statistics, and who is willing to help, are asked to contact the B.o.T.'s Director of Statistics, Horse Guards Ave, London, S.W.1.

The information collected will be used to build up representative figures showing the monthly changes in H.P. sales and debts outstanding. A code number is to be used on each return to ensure that the identity of individual firms remains unknown to staff handling the returns. Individual information will be seen only by this staff. In drawing up the questions put to retailers and finance houses, the B.o.T. have been assisted by a working group of professional and business men and from trade associations representing retailers and finance houses.

TARIFF SAFEGUARDS FOR AUSTRALIAN INDUSTRY

THE Australian Government has announced a number of higher tariffs in a move to protect Australian industry. Among the commodities affected are direct-current mill type motors, fuel injection equipment and household aluminium ware. Mr Harrison, representing the Minister of Trades and Customs, said the tariff amendments, which followed recommendations made by the Tariff Board in recent reports, would be effective from 14 Oct.

THEME OF 1956 B.E.P.C. IS ELECTRICITY AND TRANSPORT

AS previously announced the eighth British Electrical Power Convention is to be held at Torquay next year from 23 to 29 May, under the presidency of Sir John Dalton, chairman of W. T. Henley's Telegraph Works Co., Ltd. Theme of the convention will be Electricity and Transport, and the subjects discussed will probably refer to the anticipated modernisation of British Railways, battery electric vehicles, trolleybuses, signalling, shipping and aircraft. We note also that there is to be a lecture and demonstration appealing to the housewife and general public on The All-Electric House.

I.T.A.'s Lichfield Station

WORK on the I.T.A.'s Midland transmitting station at Lichfield is going ahead according to schedule, we hear. The transmitting equipment is constructed by Pye Ltd. Vision transmitter is designed to give a peak white power output of 20 kW and to operate with an associated sound transmitter of 5 kW. Apart from this equipment, a complete set of ancillary control room apparatus is being provided by the same company, together with a tele-cine machine of the latest design.

Coincidentally, the projected 450 ft mast has now reached the 90 ft mark. Its construction is being carried out by Marconi's Wireless Telegraph Co., Ltd. At the same time Marconi are erecting a similar tower and aerial at Rivington Moor, near Bolton, where they have the contract for the entire station.

Glasgow University offers Course in Nuclear Engineering

A NEW course in nuclear engineering is being offered this year by Glasgow University. It will form part of the normal B.Sc. degree course as one of the additional subjects, and will be available at first to final year students of electrical and mechanical engineering, although suitably qualified engineers already in the industry will also be admitted. If the new course proves successful, a degree devoted exclusively to nuclear engineering may be considered, we understand. The University, in offering the course, hopes to equip the practising engineer with an insight into the problems arising when nuclear fission is used as a source of heat to drive electrical generating plants.

Congress Committee examines Automation

LAST Friday a Congressional committee opened an investigation into the current controversy over the effects of automation on American industry and employment, it is reported from Washington. Some trade unions contend that the rush to automation by big corporations, who alone can afford it, may lead to unemployment, overproduction, economic dislocation and industrial unrest. Economists have also expressed concern at the possibility that automation, if too speedily pursued, may cause economic instability by dislocating existing wage structures and regional employment patterns. Employers reply that the growth in total production and the resulting increased demands for raw materials will quickly reabsorb labour replaced by automatic machinery.

Metrovick's Special Training for Spanish Engineers

A PARTY of 13 Spanish engineers arrived in this country by air recently to begin a six-months' course of training with the Metropolitan-Vickers Electrical Co., Ltd. Their visit follows the placing of a contract with the British firm for steam power station generating equipment for the Instituto Nacional de Industria. The order included six turbine generator sets and associated equipment for five power stations as well as a supplementary order for a further 15 MW set. Total value of the contract is £2,300,000. The equipment is to be commissioned early in 1957 and the trainees are being prepared for that day. They will occupy positions ranging from chief engineer to turbine attendant.

The visitors will be divided into two groups, spending half their time at the company's Trafford Park factory, and the remainder with Metrovick engineers on sites where equipment is being installed. When this course is completed, a further party will come from Spain for similar training. These courses are now becoming a feature of Metrovick's overseas contracts. Similar arrangements were made for training Turkish engineers a short time ago.

Week's Course on Electric Traction is First of Series

STAFF members of several public road passenger transport undertakings took part last week in a tour of manufacturers' works in the Midlands. The tour was arranged by BEAMA Electric Traction Equipment manufacturers as part of an educational course. It was the first to be organised but a further series is envisaged and enquiries for full details are invited. These should be addressed to the secretary of BEAMA's Electric Traction Section at 36 Kingsway, W.C.2.

The courses are intended for operators' trainees of graduate or H.N.C. standard, or other specially selected candidates. Last week's course included visits to works at Rugby, Birmingham and Sheffield, lectures by experts in electric traction, discussions and demonstrations. It started at the British Thomson-Houston Rugby works with films and discussions in the evening and following morning. The third day was spent with the General Electric Co. at Witton and included two lectures. On the last two days the party were in Sheffield at the joint factory of B.T.H. and Metropolitan-Vickers. Here, too, there were lectures, and at each factory, the visitors were conducted on thorough tours.

Full and Varied Programme at Board's Sales Conference

THE North of Scotland Hydro-Electric Board held their seventh annual sales conference at Lochearnhead in Perthshire, earlier this month. About 60 of the Board's area managers, commercial, agricultural and district engineers attended. The programme was varied and well compiled. In the first instance introductory talks were given by heads of departments.

Technical papers included "Problems Associated with Railway Electrification" by Mr F. A. Manley, G.E.C.; "The Heat Pump and Possible Developments," by Mr B. Z. de Ferranti; "Electronics in Industry," by Mr B. G. Higgins, B.T.H., and "Mains Reinforcement and Development of Consumers' Load," by Mr I. S. Smith of the Hydro-Electric Board.

"Space and Water Heating" was the subject of papers presented by three speakers: Mr G. S. Bowman, of the Board; Mr P. Honey, of E.D.A.; and Mr A. C. C. Smith, an electrical contractor of Dundee. Highlight of the final day were talks by four consumers. "The Housewife," by Mrs Patullo, Kirriemuir; "The Farmer," by Mr W. A. Adam, Elgin; "The Hotelier," by Mr R. C. Tucker, Aberdeen, and "The Industrialist," by Mr D. Duncan, Perth.

Staff Conferences for Y.E.B. Senior Personnel

TWO staff conferences were held by the Yorkshire Electricity Board at Leeds University at the end of last month. Each was attended by the chairman, deputy chairman and some part-time members of the Board, chief officers and sub-area managers, and by about 130 delegates from all parts of the Area. The conferences were divided into 13 syndicates of ten persons who discussed papers previously distributed, and the organisation and operations of the Board, before presenting a report of their deliberations. These conferences coincided with the publication of the Board's annual report, and a film based on their activities was also shown.

SUBSCRIBERS WANTED

REGULAR subscribers is the dominant need of the E.I.B.A. in raising funds, states Sir Harold Bishop, president in his appeal to the industry. Grants made last year increased by over £4,000, but voluntary income rose by only £2,459.

EDUCATING THE YOUNG WORKER

THE Education of the Young Worker is the subject of a conference to be held at Oriel College, Oxford, next April. Its theme is the education of the non-apprentice and unskilled worker and the well-being of young people who have just left school. The conference will consider the needs of those preparing for relatively unskilled occupations, who leave school at 15 to work in mines and factories, on the land, in offices or shops, and whose brief training offers little opportunity of intellectual and personal development. Oxford University's Education Department feel that a valuable contribution to the problem could be made if interested and influential people gathered to think the matter out and discuss solutions. Full details are obtainable from the conference secretary, 15 Norham Gardens, Oxford.

HIGH-VOLTAGE 50 c/s SYSTEM FOR BRITISH RAILWAYS

MORE evidence is accumulating to indicate that the 1,500 V d.c. overhead catenary system is not necessarily the method to be adopted by British Railways in their main-line electrification. In his recent lecture to the Western Region, London Lecture and Debating Society, Mr J. C. L. Train, of the British Transport Commission, emphasised this point. Referring to the Manchester-Sheffield-Wath 1,500 V d.c. electrification he stated that although the scheme was planned primarily to improve the efficiency of the freight working between the Lancashire and the Yorkshire coalfields, electrification had produced as a kind of bonus a most welcome increase in the number of passengers travelling. But where major extensions and new main line electrification schemes were concerned, serious consideration was being given to the use of a.c. at 50 c/s, taken straight from the Grid at say 25 or 6.6 kV. The attraction here was the reduction in copper for the catenary and the reduction in complication and wider spacing of the substations. The experience of French Railways with 50 c/s operation had indicated that the power characteristics of a.c. electric locomotives were superior weight for weight to those of d.c. locomotives. The only major drawback was the increased clearance required between earthed structures and the catenaries.

Lumenated Ceilings open New London Office

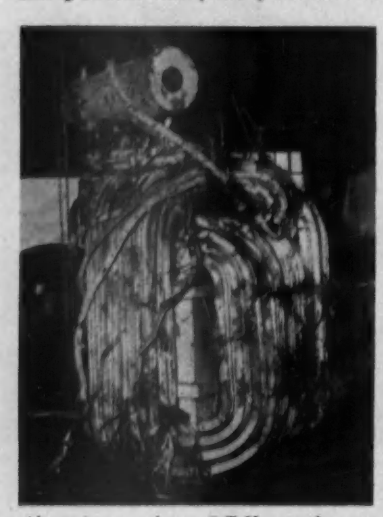
LARGER premises at Alliance House, Caxton St, S.W.1, (ABB. 7113) have recently been occupied by Lumenated Ceilings Ltd., to cope with increasing business. As one would expect, these new offices, which have been designed, furnished and decorated in the contemporary manner by Richard Lonsdale-Hands Associates, make a perfect setting for the company's Lumenated Ceiling Lighting system. In addition to their functional use these ceilings incorporate special lamp arrangements and circuits for demonstration purposes.

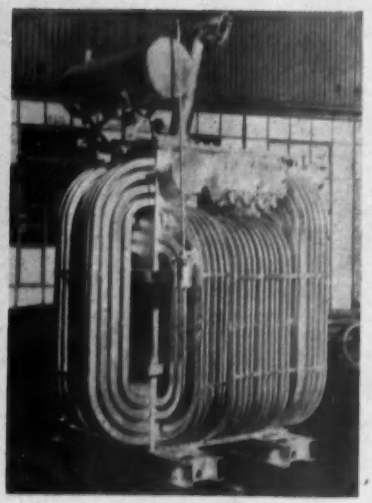
Interior of Lumenated Ceilings' new office in Caxton St, London

British Transformer survives Immersion in Flood

TO ALLEVIATE the water shortage in Capetown, two cofferdams were erected some months ago at Wemmershoek in the Cape Province Mountains, S. Africa, and the British Thomson-Houston Co., Ltd., provided four 500 kVA transformers for the civil contractors. The story of two of those transformers provides an excellent advertisement not only for the company concerned but for the quality and soundness of British manufacture.

The two transformers were swept away during an abnormally heavy rainfall and remained submerged 100 yd downstream until salvaged a week later. When eventually sent to Capetown vegetation and rocks were wedged between cooling tubes, power cables wrapped around the tanks, and a generous coating of mud over everything. The cores and windings were found to be sound mechanically and after washing down with transformer oil, drying and baking were none the worse for their immersion. Tanks and external fittings had been severely damaged and the majority of tubes had to be cut, straightened and rewelded but very few scrapped. No replacement tubes were available so the holes in the tank were blanked off. No internal repairs were necessary apart from renewal of connections from the bushings to the windings, and the transformers were soon reassembled, tested and returned to site where they have been in continuous service since.





Above is one of two B.T.H. transformers after it had been pulled out of the floodwater, and (right) the same transformer ready for service again

Geothermal Heat to save Bath Power Bills?

HALF A MILLION gallons of hot water issue from the mineral springs at Bath every day, with a temperature of about 110° F. The possibility that the heat contained in this water might be boosted to a usable temperature by a heat pump, with a factor of merit of five, was mentioned recently by Mr G. O. McLean, chief engineer of the S.W. Electricity Board, in a broadcast on the B.B.C. West Region Home Service. He suggested that a heat pump designed to save over £250 a week in fuel costs would itself cost between £8,000 and £10,000. Fuel saving would thus cover the initial cost in two years.

A.E.M.T. CONVENTION

IT was announced last week that the Assoc. of Electrical Machinery Trades will hold their annual convention next year at the Palace Hotel, Southport, from 14 to 17 Apr. Further details will be given in due course.

Meanwhile the Association's annual ball will take place at the Savoy Hotel, London, on 4 Nov. Tickets are available from the secretary at 100 Park St, London, W.1.

ELECTRICITY IN IMPROVEMENT AND CONVERSION OF HOUSES

STANDS sponsored by the E.D.A. at next week's National and Town Planning Exhibition, will stress the vital part electricity can play in the improvement and conversion of old property. With the inclusion of electric lighting, cookers, water heaters, socket outlets and similar amenities, it will be stressed, old houses can be modernised at only a fraction of the cost of a new house. Display material will draw attention by before-and-after plans to successful schemes already carried out. Special attention is to be given to electric water heating, cooking, washing, and to the Ring Circuit method of wiring. The exhibition is to be held at the Corn Exchange, Brighton, from 26 to 28 Oct.

Permanent Record of Mechanical Handling

ALMOST midway between the fourth and fifth Mechanical Handling Exhibitions, the organisers have produced a documentary film featuring many of the outstanding exhibits at last year's show. The film is a 16 mm colour film with commentary and provides an admirable pictorial record, selecting one or more examples of each of the various classes of equipment displayed. It will prove a good advertisement for the 1956 Show. The exhibition is organised every two years by Associated Iliffe Press' journal, *Mechanical Handling*. The film is available on loan from the sponsors.

The fifth Mechanical Handling Exhibition and Convention is to be held at Earls Court, London, between 9 and 19 May. It promises to be the largest and most comprehensive display of labour-saving equipment yet shown, covering over 400,000 sq ft of floor space and housing over 250 exhibitors.

Every Dane buys £18 Worth of U.K. Goods Each Year

ONCE again the Overseas Economic Survey for Denmark, published appropriately during the British Trade Fair in Copenhagen, is disappointing from the electrical manufacturer's point of view of finding an export market. That one exists is not to be doubted, but any specific information as to which particular commodity sells best is lacking, as it was, unfortunately, in the previous Survey, published in Sept. 1953. The latest Survey contains two particularly encouraging factors. Firstly, electrical machinery figures prominently among the most important Danish imports from this country. Secondly, it is of special note that every Dane—man, woman and child—buys on average over £18 worth of British goods very year. The U.K. is, of course, on excellent trading terms with Denmark and is in fact her principal supplier. Our main competitor remains W. Germany, and rivalry is growing, but it is to be hoped that our standing in the Danish market will have been enhanced a great deal by the Trade Fair. U.K. exports of electrical machinery, apparatus and appliances have been increasing steadily since 1949. In that year they valued about Kr 9·3m, but last year, the Survey notes, they had stepped up to Kr 27·7m. It must be remembered that the Danes are by no means without an electrical manufacturing industry of their own, and last year goods to the value of Kr 6·6m were sent to this country.

I.E.E. BENEVOLENT FUND

EIGHTH annual meeting of the Incorp. Benevolent Fund of the I.E.E. took place recently. On 30 June, capital of the Fund and the Chesters Fund stood at £156,495 against £154,326 last year, and income from all sources was £15,821, which was £205 more than in 1953-54. Income from subscriptions rose from £12,427 to £12,854, but this, unfortunately, was insufficient to cover expenditure, despite a small saving in the latter. Grants amounted to £9,092 and were made to 133 beneficiaries.

1956 PUBLIC SPEAKERS WILL HAVE FREE SUBJECT

DETAILS of the 1956 Public Speaking Competition, organised annually by the Electrical Development Association, were given last week, together with the choice of subjects available to competitors. An innovation is that contestants this winter will be able to choose their own subject if they wish. The two set subjects are "Atomic Power" and "The Influence of Television on our Way of Life." The free subject should preferably be an electrical one or have some connection with electricity supply or utilisation. Closing date for entries will be 1 Dec.

The competition is open to the staff of the electricity supply industry who will not be 35 on 31 Mar. next, except those gaining first place in previous national contests or have competed in two finals. As usual area competitions will be held, the winners going forward to the national final in London. Winners will receive the Faraday Silver Challenge Shield, and in each area £10 is awarded to the winner and £5 to the runner-up. Full details are contained in booklet "E.D.A. Public Speaking Competition, 1956." This year, too, the Association is issuing a second booklet entitled "Public Speaking is Good Fun." This points out the advantages of being able to stand up and speak, an asset on social and personal occasions, as well as in promoting the interests of electricity.

November Sales Drive

NEXT month Morphy-Richards are to launch a window shopping competition in which the public will be asked how they would spend £100 on the company's products. Five winners will each get their wish free and there will be 100 consolation prizes. Retailers can take part by entering the coincidental window display contest. There are to be three prizes of £150, £75 and £50, and six prizes of £25 each in specified areas, plus twenty consolation prizes of £5 each. There is a wealth of display material available to dealers, who are asked to submit photographs of their windows as entries by 3 Dec.

E.W.F. in Scotland

ANNUAL function of the Scottish section of the E.W.F. took place recently at North Berwick. Invitations were sent to the Councils of the Rubber and Thermoplastic Cable Manufacturers Assoc. and the Electric Lamp Manufacturers Assoc. and their wives, as in the past, and also to the Chairmen of the National Electrical Contractors Trading Assoc., the E.C.A. of Scotland, the E.L.F.A., the Assoc. of Manufacturers of Electric Wiring Accessories, the Associated Manufacturers of Domestic Electrical Appliances, the Indep. Cable Makers Assoc., and the Electric Water Heater Manufacturers Assoc. Golf competitions and a dinner were also held, and on the final morning the Council held a meeting to which Scottish members were invited.

$500,000 Cable Contract

CABLE contract valued at about $500,000 has been placed with Enfield Cables Ltd. by the Hydro-Electric Power Commission of Ontario. The cables will be laid in Ottawa. Two-and-a-half miles of 115 kV double circuit, 80 MVA pipeline compression cables (conductor size 300 mcm) will be laid by the company's contract dept. in Canada. The installation is scheduled to be commissioned on 1 May next.

EAW Annual Conference

IT WAS announced last weekend that the 31st annual conference of the E.A.W. will take place at Llandudno between 30 April and 3 May next year. Detailed programme of speakers and events will be issued later, but the Association's current campaign, "Planning for Light" will be featured prominently.

Hay Making in October

AS recently as last week, a Hyde, Cheshire, farmer was making hay for loading into his barn. This utilisation of late autumn grass was facilitated because the farmer is one of 30 in the N.W. who have installed barn hay drying equipment. The system is being promoted extensively by the N.W. Electricity Board. Wilting time is short, and the grass is dried by cold air forced through the hay by an electric fan. On this particular farm two bays (each 15 ft by 20 ft) have been converted at a cost of about £250. Although there has been little difficulty in making good quality hay in the Area this year, yields have been low due to shortage of rain.

The First Half-Century

On Monday the National Electrical Manufacturers' Assoc. held a business meeting at Olympia, followed by a dinner. The main question brought before the meeting was the attitude of the Assoc. towards local exhibitions. The feeling was that they were too great a tax on manufacturers, but that town councils should be encouraged to promote them at their own expense, and that on those terms manufacturers might lend machinery and apparatus. It was also decided that no new London exhibition should be supported by members unless it were under the auspices of the Assoc., which was likely to withhold its approval from any such plan for the next three years at least. As regards Christmas boxes there was a general feeling that the individual who wrote asking for one, with a hint that all orders passed through him, should be sent a circular expressing the resolution of the Assoc. not to make such presents, but this should not debar members from friendly gifts—*From our issue of 19 Oct., 1905.*

Lighting in Newspaper's Cramped Machine Room

SITUATED in the heart of the city with little space for expansion, renewal of the lighting installation in the machine room of the *Birmingham Post and Mail*, presented numerous difficulties to Crompton Parkinson lighting engineers. The renewal was made necessary by the installation of two giant rotary presses below ground level. The scheme devised utilised C.P.'s standard narrow-section reflector with 5 ft 80 W, 4 ft 40 W, and 3 ft 30 W fluorescent tubes to provide adequate illumination for the difficult lower level. Fittings, positioned to line the presses, are placed beneath the press platform and on walls adjacent to the presses. Control gear is housed vertically in cabinets made by enclosing part of the supporting H section columns.

Fluorescent units of the same type are mounted on the presses themselves. By correct application, in spite of the complication of construction, the units give 40 ft candles at the effective point. On the deck and steps, the general lighting by 5 ft 80 W tubes in translucent opal Perspex reflectors, gives some 12 to 16 ft candles; on motors, feeds and controls 20 to 24 ft candles. Safety of movement and easy inspection is thus assured. Surrounding walls are in white tile and the ceiling and underside of the decks is finished off-white. Natural type tubes have been used throughout. The installation was carried out by the newspaper's own electrical staff.

View of catwalks in the "Birmingham Post and Mail" machine room, using opal Perspex reflectors housing 5 ft 80 W fluorescent tubes

Latest display aid produced by Berry's Electric Ltd. for dealers, is a follow-up of the television advertisements for the Raydair heater. Main slogan employed is "Central Heating Comfort without the High Initial Cost." A wealth of information is included, but of note are the three redundant chimneys—electrical equivalent of the three wise monkeys—no smoke, no work, no dirt

SOCIAL ACTIVITIES

JOHNNY BELINDA

THE play of the above title is a particularly difficult play for any cast to undertake. The two principal characters have the onerous task of learning credible deaf and dumb language, and the heroine has throughout the play to simulate the affliction of a totally deaf person. The performance given last week by the G.E.C. Dramatic Society was, therefore, all the more commendable. Shirley Linge handled the difficult part of Belinda with ease and competence, and Frederick Coker as her father was excellent. Dr Jack, played by Michael Hobbins, however, provided a variable performance, and Florence Scantlebury did well in the minor role of Belinda's aunt. The audience proved most appreciative. Proceeds from the production are to be divided between the Electrical Trades Commercial Travellers Association, and the Royal Association in aid of the Deaf and Dumb.

Henley's on Way to Record

THE Henley Group of companies are experiencing this year what may result in a record output for the whole group. This was stated by Sir John Dalton, chairman of the Group at the annual staff dinner and dance, held last Saturday at the Dorchester Hotel, Park Lane. Sir John warned, however, against excessive complacency in the future.

730 members of the staff of the companies were present at this enjoyable social occasion, and speeches were kept appropriately short. The toast of The Henley Companies was proposed by Mr H. Hubbard, who had a special word for the part the engineering department was playing in the continued prosperity of the group. Mr S. R. Gee of the Liverpool Branch skilfully dealt with the toast of the Ladies, and a worthy response was made by Miss J. E. Wright of Gravesend Works.

Exhibition and Party

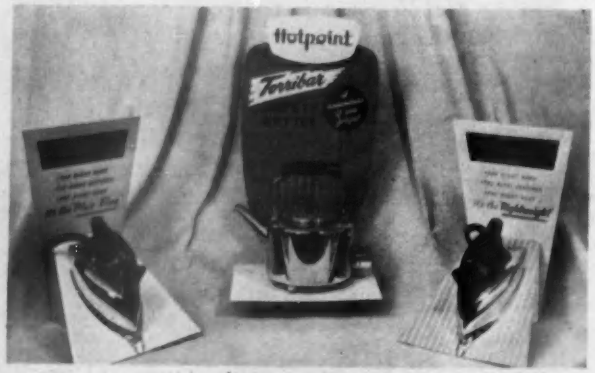
A RECORD number of nearly 600 visitors attended the sixth annual exhibition and cocktail party of British Central Electrical Co., Ltd., held at Grosvenor Hse, London. A comprehensive range of products was shown on the company's stand, and a number of other companies also made valuable contributions to the overall display of goods. The firms involved were Automatic Coil Winder and Electrical Equipment, Brentford Electric, B.T.H., Cantie Switches, Cayson Electrics, G.E.C., Lancashire Dynamo and Crypto, Truvox and Uni-Tubes. The party ended at 11.15 p.m. after an excellent floor show.

B.T.H. Annual Ball

WILLESDEN section of B.T.H. social and athletic club held their annual ball at Wembley Town Hall on Wednesday, 13 Oct. Among guests present were the Mayor of Wembley, and officials of London Business Houses Amateur Sports Assoc. Representatives from successful business house athletic teams were present to receive the various sports trophies won during the past season.

CROMPTONIAN REUNION

ANNUAL dinner and reunion of the Cromptonian Assoc. took place at the Café Royal, London, recently when over 200 members and their guests were present. The President, Mr E. C. Holroyde, was in the chair. Sir Harold Bishop proposed the toast of the Association, to which the President replied. A pair of early Irish glass candlesticks was presented to Mr H. H. Spencer, in appreciation of his 21 years as hon. secretary.



New display stands produced by Hotpoint Electric Appliance Co. for their Torribar safety kettle, and Plus 5 and Lightweight irons. They will be distributed to the trade by local branch offices

TV IN CARS

IT WAS only a matter of time before television was fitted inside the motor car, but the distinction of being the first to achieve this novelty is claimed by E. K. Cole Ltd. The set is making its debut at this year's Motor Show, which opened at Earls Court yesterday. It will be shown by Freestone and Webb Ltd. in their Rolls Royce "Silver Raith" limousine. The 9 in. tube Ekcovision receiver has been specially styled into the rear compartment division and is so positioned as to provide comfortable viewing for passengers. The set measures 10½ in. wide by 13 in. high by 15 in. deep, and works off the car's 12 V battery. This television set uses an ordinary wing mounted telescopic car radio aerial to pick up both B.B.C. and I.T.A. transmissions, as well as VHF radio programmes, and can be used up to within 25 to 30 miles radius of the transmitter.

Moved Next Door

MANCHESTER Association of Engineers have moved their offices from 20 to 18 Booth St, Manchester 2. New telephone number is Central 1717.

FIFTEEN NATIONS DISCUSS STUD WELDING PROCESS

THE stud welding organisation of Crompton Parkinson Ltd., recently staged a conference in London at which representatives from 15 countries were present to review development and research experience since the previous meeting held in Paris just over two years ago. One of the conclusions reached by the conference concerned the great prospects for the future. Originally the system was regarded as a more economical and faster alternative to conventional drilling and tapping. Now, new fields of application were being found and stud welding was becoming a distinct advantage in its own right rather than a mere alternative. Emphasis was laid, at the conference, on the importance of introducing mechanisation into workshop stud welding by means of indexing fixtures, and the automatic feeding of studs through the tool. Such speedier machining has led to parallel development of power sources, especially transformer-rectifiers, which can supply adequate stud welding power more continuously than earlier designs.

NEWS IN BRIEF

An electric battery factory is to be established in Turkey, to make the same type of battery as the Ever Ready Co., of Great Britain used to sell there, by arrangement with the U.K. concern. The factory is controlled by the Turkish Government. Although Ever Ready have a small financial interest, they have granted licences for the manufacture of their Beric type export batteries, and provided technical assistance.

Current local Press advertisements of the Eastern Electricity Board draw attention to electric storage heaters for shops, offices, works, schools, and similar premises.

Each of the 1,500 employees of Bruce Peebles and Co., Ltd., have received a handsomely produced brochure outlining the history of the company, to mark the 88th anniversary of the firm's foundation.

A small booklet, 5 in. by 4 in., has been produced by the East Midlands Electricity Board explaining the important facts and figures contained in their seventh annual report, for the benefit of their employees.

The Express Lift Co., Ltd., have received a further contract for 150 passenger lifts for housing estates, from the L.C.C. The order is valued at £386,020, and is claimed to be the largest lift contract awarded in this country.

Full details of the Institute of Welding's Autumn Meeting in London, from 2 to 4 Nov., were issued last week.

B.B.C.'s new medium power TV station at Core Hill, Meldrum, was opened last week by Mr Tom Johnston, former Secretary of State for Scotland and now chairman of the Scottish Broadcasting Council. Main transmitters and aerial system were supplied by Marconi Wireless Telegraph Co., Ltd.

Details of their new factory at Richmond and some of the instruments they make, are contained in a folder compiled by Electronic Instruments Ltd.

Scottish Building Centre at 425 Sauchiehall St, Glasgow, have arranged a series of film shows on Wednesday evenings, on a variety of subjects. We note that on 26 Oct. film on "Electronics" showing practical applications, such as temperature control and cinema lighting, and on "Power Lines," showing the manufacture and testing of cables, will be viewed.

Marconi Instruments Ltd., in conjunction with Svenska Radioaktiebogalet, have secured a £23,000 contract for signal generators from the Royal Swedish Air Board.

Fraser and Chalmers Engineering Works of the G.E.C. has received a contract from Ilva Altifoni e Acciaierie d'Italie, Genoa, for a Robins-Messiter ore blending plant for their Piombino steelworks. Electrical control gear will be supplied by Witton works.

ELECTRIC SUPPLY NEWS

Highlands

At a meeting of Inverness Town Council recently, Provost R. Wotherspoon was reported to have complained that the Highlands should not be called on to pay for transmission lines used to "export" electricity south. The Board have now replied, stating there was some misunderstanding as to the purpose of the line. The grid actually carried power in both directions, the statement explained. It pointed out that last summer, when the N. of Scotland Board was seriously affected by the drought they imported energy from the south to meet the needs of their consumers. Rationing would have been necessary if electricity had not been brought to the Highlands in that way. In wet years, of course, the reverse happened.

Lake District

A good deal has already been written about the scheme for supplying electricity to the Borrowdale area of the Lake District. The project is now expected to be delayed further by the Government's decision to curtail expenditure of nationalised industries. It is reported that the N. Western Electricity Board have stated it was impossible to say at present, when work would begin. It was originally intended to start work on the scheme last month, and complete it by the spring.

Lancashire

Royton is to receive a new supply of electricity. The surveyor, Mr K. Halliwell has reported that a new 132 kV overhead line was to be erected to serve the township, and especially industry, with a lead to the national grid at Chadderton. He also stated that the C.E.A. were taking the line a longer way round than was necessary, in order to make it as inconspicuous as possible. It is proposed to take the line through the valley between Tandle Hill and Thorp. No objection is to be raised by the Crompton and Chadderton local authorities to the high voltage network over their areas, despite the fact that they would not benefit from the installation, as Royton would. Royton's surveyors' committee accepted the scheme and will raise no objection to the overhead network.

Buckinghamshire

Denham and Gerrards Cross parish councils are seeking full reports on proposals to erect more overhead transmission lines in their localities. The matter was brought to their notice by a landowner who was consulted about some land where towers were to be built. The parish councils have learnt that the line will begin at Iver Heath, cross the Fulmer Valley and Alderbourne, traverse the Oxford Rd at Gerrards Cross, pass over woodlands at Oak End and then cross Slade Oak Lane and Denham before continuing into Hertfordshire. Denham parish council protested about the erection of overhead lines in their area a short time ago, but on that occasion they were too late.

E. Midlands

People living near the route of the new 275 kV grid between Staythorpe and Drakelow have been assured they will not suffer interference to their radio and television reception when the line is commissioned. The assurance was given at a meeting of the Notts local committee of the Midlands Electricity Consultative Council.

Kintyre

Electricity was switched on for the first time last week on the island of Gigha, off the Kintyre coast. All the island's 72 houses have been connected, and farmers are installing electrically operated milking machines.

Sayings OF THE WEEK

"In the past six years the number of electric motors installed in the mines has more than doubled and nearly half as many more coal-cutters, and four times as many conveyors are now in use." . . . MR T. G. DASH, addressing S. Wales Inst. of Engineers.

"Since man first decided to rotate a wheel on an axle, the process of boring the holes seems always to have lagged behind his ability to provide the shaft." . . . MR C. A. SPARKES, in his presidential address to Manchester Assoc. of Engineers.

"There is still a great deal of mystique and tradition about British industry, some of it out of date and a drag on progress. The well-educated and trained engineer should be able to sort the wheat of inherited skills and know-how from the chaff of dead custom and inertia." . . . MR D. B. HOGG, in his address as chairman of I.E.E. Utilisation Section.

LIGHTING SCHEMES

Erith (Kent). Alternative schemes being prepared for proposed conversion of gas to electric street lighting.

Leeds T.C. Preliminary details of scheme for relighting City Sq approved by Street Lighting Committee. It was reported that loan sanction for £59,000 has been granted for improved lighting in ten roads.

Plymouth T.C. Permission to be sought to borrow £64,210 for conversion of 1,680 street lamps from gas to electricity.

Swanley (Kent). Parish Council has been authorised to raise £3,300 loan and go ahead with trunk road lighting scheme for London to Folkestone Rd between Birchwood and Wested Lane.

COMPANY ACTIVITIES

THE announcement by Mr C. O. Stanley, chairman of Pye Ltd., that the group has made an offer for the Ordinary shares in Tecnico Ltd., of Sydney, New South Wales, is the latest development of the group's policy of spreading its activities. Pye's ramifications are already pretty widespread.

Tecnico controls two subsidiaries, F. W. Davey of Melbourne and Bendix-Tecnico. The Davey subsidiary adds several new lines to the Pye list for it manufactures D.C. motors, generators, home lighting and power plant, switchgear, invertors, relays for railroads, water pressure systems and induction motors, while the Bendix-Tecnico arm manufactures under licence from the Bendix Aviation Corporation of the U.S.

It is significant of the credit squeeze that Bakelite is proposing to raise £1m 6% Preference shares privately. Normally it would have been thought easy and reasonable for the shares to be offered to shareholders especially as over half the Ordinary capital of £1·5m in 10s. shares is held by Union Carbide and Carbon Corporation (of U.S.A.) and nearly 500,000 shares by Pinchin, Johnson and Associates Ltd.

At the moment, however, it is the directors' intention to issue the shares by way of a private placing which rather looks as if the stock will go to the big financial institutions.

Excellent results are announced by Ever Ready (South Africa) Ltd. Net profits for the year to June last totalled £102,295 compared with £85,373. Mr W. H. Lawrenson the chairman reports that the demand for the company's products has been excellent throughout the year and sales reached a new high record. The current year was commenced satisfactorily and sales are being well maintained. A note of caution is that the company has not yet felt the full weight of overseas competition which will undoubtedly come in due course with the complete removal of import control.

But the board is confident that the company will be able to continue to sell its products in the Union and in export markets on a competitive basis.

From our point of view in this country it is strange to hear that the company is encountering an increasing demand for radio batteries as the sale of dry-battery operated radio receivers is increasing considerably due to the development of new transmitting stations of high power within the Union, such as Bloemfontein.

The greater part of the population of South Africa are coloured people with lower standards of living than we are accustomed to in this country. Dry-battery operated radio receivers are cheaper than conventional receivers and the cost of the battery need be little more than 1d. per hour of listening time. —*From our City Correspondent.*

A.E.I. (Australia)

An offer for sale is being made in Australia by Associated Electrical Industries, London, of 1,050,000 shares in the newly-formed company A.E.I. Ltd., registered in Victoria, Australia. Issued at 20s. 4d. Australian currency (16s. 3d. sterling) the shares are expected to raise 7½%. The new company was formed to acquire from A.E.I. London the total issued shares of the operating company known until last Aug. as Australian General Electric Pty.

Electrical Apparatus Co.

Subject to audit, net profit for the year ending 31 July, 1955, is £150,000 (*£126,063*), after taxation of £144,000 (*£159,750*). As previously announced final dividend of 15% makes 22½%.

T. W. Ward

An effective rise of 2½% in the dividend on the £2·2m Ordinary capital and a sharp increase in profits for the year to 30 June, 1955, are shown in the preliminary statement.

The final dividend is raised from 10% to 11½%, making 15%. For the previous year a total of 15% included a 5% interim which was paid on £1·1m capital prior to a 100% scrip issue.

Group net profit has advanced from £788,490 to £1,136,972, after an increased taxation charge of £1,215,557, against £1,024,699, and after deducting £51,840 (*nil*) for capital payments made by certain subsidiaries to the pension scheme.

Results are as follows:

Group net profit £1,136,972 (*£788,490*); after tax £1,215,557 (*£1,024,699*); capital payments subs. £51,840 (*nil*); from reserves £111,166 (*£79,505*); to minority ints. £161,670 (*£33,219*); retained by subs. £339,045 (*£204,811*); general reserve £400,000 (*£341,116*); forward £567,169 (*£459,563*).

Pressed Steel

A "rights" offer to raise just over £1½m for the Pressed Steel Company is now being underwritten.

The issue will consist of 1,893,968 5s. Ordinary shares in the proportion of one for every £1. 15s. of stock held. The price is expected to be 16s. per share.

J. and F. Stone Lighting and Radio

Group results for the year show gross income £980,850 (*£895,261*). Profits for the year before tax are £833,578 (*£753,211*). Taxation takes £400,460 (*£442,700*), dividends absorb £138,000 (*£133,654*), bonus £34,500 (*£33,000*) and profits tax on distributed profits £60,000 (*£60,601*) leaving £232,500 (*£227,255*) net £260,707 (*£265,701*) is carried forward and £125,000 (*£75,000*) is transferred to reserves.

The directors have recommended a final dividend of 30% (*same*) less tax plus a bonus of 10%, less tax, on the Ordinary stock of the company, making, with the interim dividend of 10% paid in April, 40% for the year plus a bonus of 10%.

Telcon

The company has received Treasury permission for issue at 22s. 6d. per share of the remaining 68,862 ordinary shares of £1. The shares will be offered to employees.

T. Clarke and Co.

The Directors of this electrical contracting concern have recommended that the capital be increased to £250,000 by the issue of 1,500,000 new Ordinary shares of 2s. and that £50,000 (£409, 12s. 10d. of E.P.T. Refund and £49,590, 7s. 2d. of share premium a/c) be capitalised and applied in paying up in full 500,000 Ordinary shares of 2s. to be distributed amongst holders registered 24 Oct. in proportion of one new ordinary share for every two Ordinary shares held. Fractions will be sold. New shares will not participate in interim dividend recently declared but will rank for all future dividends. The issue carries no implication that total amount distributed by way of dividend will be increased.

Telephone Properties

At an extra-ordinary general meeting of Telephone Properties Ltd. held last week the special resolution increasing the capital of the company to £1,150,000 and authorising the issue to ordinary stockholders of three new ordinary shares, credited as fully paid up, for every £2 of ordinary stock held by them on 30 Sept., 1955, was duly passed.

Special resolutions changing the name of the company to Temple Bar Investment Trust Ltd. and amending the articles of association were also passed.

Richardsons Westgarth

Interim dividend of 6¼% on £1,769,360 Ordinary just announced by the company is in the way of an innovation—it is the first since the 4% on £1,061,616 in 1943-44. This follows the raising of fresh funds by a "rights" issue of 1,665,000 Ordinary 5s. shares at 12s. 6d. (250,000 shares were issued to employees and the rest to Ordinary holders in the ratio of 1-5). This issue does not rank for the interim just declared.

Dividends Declared

Glenfield and Kennedy Holdings.—Interim of 5% less tax payable 1 Dec., 1955—5½% cumulative preference stock normal half yearly dividend (2¼% actual) payable 31 Dec.

Ever Ready.—Interim dividend of 7% (*6%*) payable 1 Dec.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

21 Oct.—Co. Antrim. Installation in Welfare centre at Ballyclare.—See 6 Oct. issue.

21 Oct.—Isle of Ely T.C. Sodium lanterns, steel columns, etc., for street lighting scheme along A.10.—See 13 Oct. issue.

22 Oct.—Clydebank T.C. Poles, lanterns, auxiliary gear and overhead cable for Great Western Rd.—See 13 Oct. issue.

22 Oct.—Dagenham T.C. Group A lighting units in Eastern Ave.—See 6 Oct. issue.

22 Oct.—Co. Down. Installation at Hillsborough primary school.—See 6 Oct. issue.

22 Oct.—Durham. Electrical equipment to Windlestone Hall residential school.—See 6 Oct. issue.

24 Oct.—Ashton-under-Lyne T.C. Installation in 28 flats on Taunton estate.—See 13 Oct. issue.

24 Oct.—Birmingham T.C. Lighting and power at Summer Lane day nursery.—See 13 Oct. issue.

24 Oct.—Bowland (Lancs) R.D.C. Electrically-operated pumping plant.—See 29 Sept. issue.

24 Oct.—Middlesbrough. 150 h.p. slip-ring motor and vertical centrifugal pump with switchgear, etc., at Fighting Cocks pumping station.—See 6 Oct. issue.

24 Oct.—Northampton T.C. Class B street lamps, comprising steel columns, tungsten lanterns, etc.—Advertised in 6 Oct. issue.

24 Oct.—Peterlee. Installation in 136 houses on Dene House sites.—See 6 Oct. issue.

24 Oct.—Southampton T.C. Rewiring and improvement at Portswood secondary school.—Advertised in 6 Oct. issue.

25 Oct.—Longbenton U.D.C. Installation in 40 houses at Seaton Burn.—See 13 Oct. issue.

26 Oct.—West Hartlepool T.C. Installation in Brierton county secondary school.—See 6 Oct. issue.

27 Oct.—Belfast T.C. Condensate chemical treatment plant for turbo-alternators.—Advertised in 15 Sept. issue.

27 Oct.—Newbury T.C. Lanterns, steel columns and control gear for trunk road lighting along A.4.—Advertised in 29 Sept. issue.

28 Oct.—Clay Cross U.D.C. Group A lighting units over ¼ mile of A.61.—Advertised in 29 Sept. issue.

28 Oct.—East Antrim. Electrical installation in Sir Thomas and Lady Edith Dixon Hospital, Cairndhu. J. M'Candless, consulting engineer, 6 Murray St, Belfast. Deposit £3. 3s.

28 Oct.—Hyde T.C. Sodium and fluorescent street lighting units, concrete columns, etc., for Group A schemes.—See 13 Oct issue.

29 Oct.—Higham Ferrers T.C. Supply of 50 concrete columns with brackets, lanterns, 150 W tungsten lamps and accessories for Class B installation. Borough Surveyor, Town Hall.

29 Oct.—Milford Haven U.D.C. Concrete columns with sodium lanterns, for Group A street lighting along A.4076.—See 6 Oct. issue.

31 Oct.—N. Ireland. Electrical installation in R.U.C. District and U.S.C. County, headquarters and married quarters at Magherafelt, Londonderry, Ministry of Commerce (Room 103) Law Courts Building, May St, Belfast.

31 Oct.—Reigate T.C. Class A street lighting equipment on A.23.—Advertised in 13 Oct. issue.

31 Oct.—Stranraer T.C. Installation in block of flats in Foundry Lane.—See 29 Sept. issue.

31 Oct.—Thornaby-on-Tees T.C. Electrical installation in 24 bungalows on Redcar Rd site. Borough Engineer, Town Hall. Deposit £2. 2s.

3 Nov.—N. Ireland. Electrical installation in 137 dwellings at Ballyclare. N.I. Housing Trust, 12 Hope St, Belfast. Deposit 10s.

4 Nov.—Berwickshire. Installation in 64 houses on eight sites.—See 13 Oct. issue.

4 Nov.—Bradford. Supply of electric lamps during 1956. Supplies Officer, Royal Infirmary, Bradford 9.

4 Nov.—Plymouth T.C. Installation of about 1,930 socket outlets and 230 spur units in Council dwellings, and supply only of about 1,890 bar type electric fires. Housing Manager, Municipal Offices, George St.—Advertised in this issue.

5 Nov.—Dagenham T.C. Supply and erection of 49 Group A and about 1,715 Group B street lighting units for stage VI of conversion scheme. Engineer and Surveyor, Civic Centre.

5 Nov.—Leeds T.C. Group A street lighting schemes in Scott Hall and Harrogate Rds. and in Easterley Rd.—Advertised in 6 Oct. issue.

5 Nov.—Ludlow T.C. Sodium lighting units along Newport-Shrewsbury trunk road.—Advertised in 13 Oct. issue.

5 Nov.—New Windsor T.C. Lamps and electric fittings and cable during 1956.—See 13 Oct. issue.

7 Nov.—Merthyr Tydfil. Pumping plant for Taf Fechan Water Board.—See 29 Sept. issue.

7 Nov.—Skipton U.D.C. Mercury vapour discharge street lighting units and steel columns for trunk road.—See 13 Oct. issue.

9 Nov.—Co. Antrim. Electrical installation in proposed extension to Largymore primary school, Lisburn. J. M'Candless, consulting engineer, 6 Murray St, Belfast. Deposit £3. 3s.

9 Nov.—Newark-on-Trent T.C. Supply and erection of 85 concrete and 7 steel columns 400 W mercury lighting equipment, for Group A lighting along 3,133 yd of trunk roads A.46 and A.17. Borough Surveyor, Municipal Bldgs, Balderton Gate. Deposit £2. 2s.—Advertised in this issue.

11 Nov.—Abingdon T.C. Supply of sodium lanterns and auxiliary gear and supply and erection of concrete columns, etc., for Group A lighting along trunk road A.34. Engineer and Surveyor, The Abbey House.

11 Nov.—Malden and Coombe T.C. Supply and erection of 140 W sodium lanterns on concrete columns for Group A street lighting in Church Rd. Council offices, Malden, Surrey.

14 Nov.—Bristol T.C. Supply and installation of electrically illuminated and operated signals for control of pedestrian crossings. City Engineer, 470 Bath Rd, Brislington.

19 Nov.—Co. Galway. Pumping and filtration plant at Oughterard.—See 29 Sept. issue.

21 Nov.—Middlesex. Supply and installation of p.i.l.c.s.w.a. cables for power supply, together with lighting and plug circuits at Mogden purification works, Isleworth. Chief Engineer, Middlx County Main Drainage Dept., P.O. Box 7, Isleworth.—Advertised in this issue.

28 Nov.—Fifeshire. Steel columns, sodium lanterns, etc., for Group A lighting at Windygates.—See 13 Oct. issue.

3 Dec.—Lincoln. Supply and erection of land drainage pumps and electric motors with starter equipment and ancillary plant for Upper Witham Internal Drainage Board. Engineer to Board, J. Barnatt, 20 Orchard St. Deposit £2. 2s.

5 Dec.—Leeds T.C. Electrically-driven centrifugal pumps with motors and

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 125 queries answered this week

"Pearl" aluminium ware, makers of? S.W.B.—Pearl Industries Ltd., Birmingham Factory Centre, Kings Norton, Birmingham.

"Quain" sunray equipment, makers of? E.B.—British Quain Sunlight Ltd., 9 Woodhouse Rd, N.12.

"B.E.S." electro medical equipment, makers of? S.E.B.—Barber Electrical Services Ltd., 6/7 Leach St, Birmingham 16.

"Gregg" ceiling roses, makers of? T.E. —Ranton and Co., Ltd., 6 Commerce Rd, Brentford.

Insect destroyers, makers of? N.R.—Shepherd's Aerosols Ltd., 23 Old Bond St, W.1; Vulcan Fumigator Co., 1 Jermyn St, S.W.1; Associated Fumigators Ltd., 114 Victoria Dock Rd, E.16; Tack Air Conditioning, Ozonair Hse, Longmoore St, S.W.1.

ANSWER WANTED

Meat-slicing machine marked "Pen Dove Products," address for spares? K.C.C.

switchgear for Headingley filtration works pumping station.—See 6 Oct. issue.

12 Dec.—Easthampstead R.D.C. Group A and B street lighting units.—Advertised in 13 Oct. issue.

No date stated—Devon. Supply and installation of four 140 W complete cut-off sodium lanterns on 25 ft concrete columns at Drumbridges roundabout. County Surveyor, Coaver, Topsham Rd, Exeter.

No date stated—N. of Scotland H.E. Board. Lighting, heating and auxiliary cabling at Meig Dam.—Advertised in 13 Oct. issue.

No date stated—N. of Scotland H.E. Board. Supply and installation of 11 V main power cables and auxiliary cables at St. Fillans power station. Kennedy and Donkin, 12 Caxton St, London, S.W.1. Deposit £2. 2s.—Advertised in this issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.*

10 Nov.—New Zealand. Post and Telegraph Dept., G.P.O., Wellington, invites tenders (P and T 150/8296) for considerable quantities of telephone cable, paper insulated, star quad, lead alloy sheathed, steel tape armoured and served. B.o.T. (Ref.: ESB 20948/55).*

11 Nov.—Rhodesia and Nyasaland. Supply of 20 kW medium wave transmitter at Kitwe for Federal Broadcasting Service. Details from Director, Federal Information Dept., P.O. Box 8140, Causeway, S. Rhodesia. Tender No. 2400. B.o.T. (Ref.: ESB 20825/55).*

11 Nov.—South Africa. Stores Dept. of S. African Railways, Johannesburg, invite tenders (F.5368) for two generating plants with two switchboards and accessories. B.o.T. (Ref.: ESB 21964/55).*

14 Nov.—India. Supply of electrical equipment—transformers, h.t. and l.t. switchgear, static condenser, l.t. distribution boards, etc.—for conversion from d.c. to a.c. at Dock II, Kidderpore Docks. Documents (at Rs. 10) from P. C. Basu, chief mechanical engineer, 8 Garden Reach Rd, Kidderpore, Calcutta 23. B.o.T. (Ref.: ESB 21375/55).*

16 Nov.—India. Supply and erection of electrically-driven vertical pumping plant with accessories at Impounding pumping stations, Kidderpore Docks. Documents at Rs 10 each from P. C. Basu, chief mechanical engineer, 8 Garden Reach Rd, Kidderpore, Calcutta.

18 Nov.—Canada. Saskatchewan Power Corporation invite tenders for estimated requirements of electrical construction material for 1956. 59 items are included in the list. Supply Manager of Corporation, 1739 Cornwall St, Regina, Saskatchewan. B.o.T. (Ref.: CRE 10508/55).*

23 Nov. — Uruguay. Administracion General de las Usinas Electricas y los Telefonos del Estado require circuit-breaker of three-pole air-break type for 600 V, 50 cycles, to operate on circuit of 380 V on switchboards at Rincon del Bonete power station. Specif. No. 2412. Tender 4219/55. (B.o.T. (Ref.: ESB 21243/55).*

25 Nov.—India. Supply of power circuit-breakers for power supply to Eastern Railways at Howrah, Burdwan and Belmuri. Specif. No. ED715-3 Dep. Chief Electrical Engineer (E and R) Damodar Valley Corpn., Anderson Hse, Alipore, Calcutta. B.o.T. (Ref. ESB 21862/55).*

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 18 October

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	354	—	269
„ (3 months)	341	−4½	257
R.S.T. (Rhodesian Selection Trust) group price*	360	—	—
LEAD, refined pig, min. 99·97% purity (cash)	107½	+1½	107½
„ (3 months)	107½	+½	102
TIN, refined, min. 99·75% purity (settlement)	761	—	731
„ (3 months)	749	−1	732
ALUMINIUM, ingots 99·99·5%	171	—	150
ZINC, virgin, min. 98% purity (cash)	92	+1½	82
„ (3 months)	91½	+1½	81½
RUBBER No. 1, RSS. spot (per lb.)	36d.	−⅛d.	24⅛d.–25d.
„ c.i.f. basis, ports. Dec. (per lb.)	35⅛d.	—	22⅛d.
ARMOURING :			
Galv. Steel Wire (0·104 in.)	56½	—	52½
Mild Steel Tape (0·04 in.)	43½	—	40½

(*Fixed price c.i.f. U.K., now subject to change at 24 hours' notice, to "consumers willing to instil a degree of stability into the resale price.")

29 Nov.—Australia. Manufacture, supply, etc. of four three-pole, 12·5 kV, 4,300 amps, 1,000 MVA circuit-breakers, and / or four three-pole 12·5 kV, 4,300 amps isolating switches for TI power station. Contract No. 40,011. Snowy Mountains Hydro-Electric Authority. B.o.T. (Ref.: ESB 21725/55).*

29 Nov.—Uruguay. External lighting appliances for external illuminations of Palacio de la Luz including 28 street lighting units for 500/1,000 W lamps, and 200 1,000 W, 160 500 W and 50 200 W lamps all 230 V. Specif. 2278. Administracion General de las Usinas Electricas y los Telefonos del Estado, Seccion Licitaciones, Montevideo. B.o.T. (Ref.: ESB 21758/55).*

6 Dec.—New Zealand. Supply of total of nearly 70,000 ft telephone switchboard wire, conductor sizes of ·024 in. and ·036 in. and various colours. Contract P and T 157/322. Store Div., Post and Telegraph Dept., Willis St, Wellington. B.o.T. (Ref.: ESB 21940/55).*

14 Dec.—Australia. Tenders (specif. 507) invited by Queensland State Electricity Commission, Brisbane, for electric batteries and charging equipment required by Townsville Electricity Board. B.o.T. (Ref.: ESB 20800/55).*

4 Jan. 1956—India. Manufacture, supply, etc., to Riverside power station at Kanpur of two 1,300 kVA 6·6/3·3 kV, two 650 kVA 3·3/0·4 kV, and one 400 kVA 3·3/0·4 kV. Documents at Rs 75 a set from K. C. Gupta, General Manager, Kanpur Electricity Supply Admin., Kesa Hse, 14/71 Civil Lines, Kanpur.

14 Jan., 1956—India. Supply and erection of equipment for Rihand Dam power station including 5 generating units, equipment for outdoor switch yard and transformers. Chief Engineer, Electricity Dept., Uttar Pradesh, Lucknow, on payment of Rs 150. B.o.T. (Ref.: ESB 20714/55).*

31 Jan., 1956—New Zealand. Manufacture, supply, etc., of 150 MVA 11,000 V switchgear of duplicate busbar indoor metal-clad, draw-out type, and accessories, for Kikiwa substation. State Hydro-Electric Dept., Wellington. B.o.T. (Ref.: ESB 20950/55).*

7 Feb., 1956—New Zealand. Contract 291 calls for four single-phase auto-transformer units, each 33,333 kVA 127/63·5/11 kV, 50 cycles, outdoor type, oil immersed with (preferably) natural cooling, for Otahuhu substation. State Hydro-Electric Dept., Wellington. B.o.T. (Ref.: ESB 20988/55).*

14 Feb.—New Zealand. Tenders (No. 292) invited for 3-phase 2,500 kVA 11 kV 50 cycles tap changing on load regulating transformer, outdoor type, oil immersed and natural cooled; and 3-phase 500 kVA 11 kV earthing transformer outdoor type, oil immersed and natural cooled; or 3-phase 2,500 kVA 11 kV 50 cycles regulating transformer incorp. earthing transformer. State Hydro-Electric Dept., Wellington. B.o.T. (Ref.: ESB 21950/55).*

Contracts Placed

Belfast T.C. Installation in Mersey St primary school, W. F. Graham and Co., Ltd.

Durham. Among contracts placed for electrical installations in schools are: Seaham Harbour Deneside country, Armstrong and Ryan, £2,785; Annfield Plain modern, Law and Burns Ltd., £3,689; Bishop Auckland Woodhouse Close infants' county, R. Robson, £1,406; and Horden Day special, T. Mitchelson (Electrical) Ltd., £1,353.

London. Electrical installation at Wenlake and Chadworth Bldgs, Finsbury, Carr Bros. and Carr (Wandsworth) Ltd., £7,405.

Newcastle-on-Tyne T.C. Overhead electric lines at Slatyford Lane transport depot, British Insulated Callenders' Cables Ltd., £3,327; also overhead line equipment, Alfred Wiseman and Co., Ltd., £1,403.

St. Pancras B.C. Sodium vapour discharge lighting units on concrete columns in four roads, Revo Electric Co., Ltd., £9,075. Also lighting installation at Suffolk Wharf Refuse Transfer Station, London Electricity Board, £2,280.

West Hartlepool T.C. Installation in 114 3-storey flats on Owton Manor estate, Heslop and Hall Ltd.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Tunsand. 743,374. Class 9. Electrical and electronic apparatus, etc. G. F. Faulkner (Export and Import) Ltd., 40 Tonbridge Rd, Maidstone.

Bicelflux. 743,847. Class 9. Insulated wires and metal strips. British Insulated Callenders Cables Ltd., Norfolk Hse, St, W.C.2.

Pyeco. 741,059. Class 9. Radio and television apparatus, etc. Pye Ltd., Radio Works, St. Andrews Rd, Cambridge.

BUSINESS PROSPECTS

Home

Aberdeen. Plans approved for admission block at Royal Mental Hospital.

Co. Armagh. Erection of county intermediate school at Killycomain, Portadown. Quantity surveyor, A. G. Crawford, 1 Lombard St, Belfast.

Barking T.C. Tenders may soon be invited for electrical installation in Thames View county infants' school.

Birmingham T.C. Construction of 43 dwellings on Malthouse estate, Yardley. A. G. Sheppard Fidler, City Architect, Civic Centre.

Bolton-upon-Dearne U.D.C. Erection of 90 houses on Whin Wood estate, Thurnscoe. Engineer and Surveyor, Council Offices.

Cardiganshire. Erection of infants' school at Penparcau, Aberystwyth. Clerk of County Council, County Office, Aberystwyth.

Carlton U.D.C. Construction of 34 houses on Grange Cresc site. Engineer and Surveyor, Council Hse, Burton Rd.

Carshalton U.D.C. Erection of 32 flats and maisonnettes in Wrythe Lane. C. H. Durrant, clerk of council, Council Offices, The Grove.

Chatham. Tenders may soon be invited for erection of Jewish chapel of rest in Palmerston Rd.

Chelmsford. Factory extension proposed on Widford industrial estate by British Vitamin Products Ltd. Architect is S. Bragg, 119-121 High St, Witham.

Cross Hill (Lancs). 1955-56 building programme provides for erection of second phase of Lancaster and Morecambe College of Further Education. Estimated cost £140,638.

Doncaster. R.C. Authorities to build school at Cantley estimated to cost £300,000.

Durham. Alterations and additions to be carried out wiring systems at Leadgate county, Spennymoor North Rd county, Mariville in Princes St, Burnopfield modern, Durham Whinney Hill modern, and Hartlepool Galley's Field modern schools.

Essex. Erection of Rayleigh Sweyne secondary grammar/technical school. H. Conolly, County Architect, County Hall, Chelmsford.

Hackney B.C. Development of Amhurst Rd site will include 18 maisonnettes and 59 flats.

Harlow. Factory in Western industrial area for Development Corpn. for Kingsgate (Clothing Productions) Ltd., 29 Dingley Place, E.C.1. Architect is V. Hamnet, Terlings, Gilston.

Hartlepool. Additions costing £2 millions are planned at factory of Steetley Magnesite Co., Ltd.

Hinckley U.D.C. Eight shops and living accommodation to be constructed on Sketchley Hill estate.

Huddersfield T.C. Erection of 3-storey block of 4 shops and maisonnettes on Fernside estate. Borough Architect, High St Buildings.

Hull. Preliminary plans prepared by city architect for new telephone exchange in Osborne St. Cost estimated at £340,000.

Ilford. Schemes in hand in borough included public baths at Barkingside to cost about £430,000; administrative offices, store and garage in Ley St for which architects are Ansell and Bailey, 12 Grays Inn Sq, London, W.C.1; and laboratory at Redaluma works in Grove Rd, for which W. J. Lewis and Sons, 68 Cranbrook Rd, are architects.

Kidderminster. £290,000 to be spent on rebuilding and modernising works and new machinery by Carpet Manufacturing Co., Ltd., New Rd.

Lancaster. Chest clinic at Beaumont Hospital proposed. Manchester Hospital Board have approved scheme in principle.

Leicester T.C. New secondary modern school to be built at Rushey Fields, and new girls' school costing £238,376 on New Parks estate.

Limerick. Construction of primary school at Prospect. D. J. O'Brien, chartered quantity surveyor, 87 O'Connell St.

Liverpool T.C. Proposals to be considered for rebuilding blitzed City Museums between William Brown and Clayton Sts. Scheme estimated to cost £500,000.

Londonderry. Intermediate schools to be built at Faughanbridge and Dungiven during 1956 at resp. estimated costs of £95,000 and £80,000.

Otley U.D.C. Construction of 32 houses on Weston Lane estate. Engineer and Surveyor, Council Offices, North Parade.

Oxford. Morris Motors Ltd. propose erection of paint plant at cost of about £2½ millions. Also, plans submitted for addition of second storey to bakelite dept. at Eagle Iron works in Walton Well Rd for W. Lucy and Co.

Second instalment of new buildings for College of Technology, Art and Commerce to be included in 1956-57 school building programme. Cost estimated at £303,000.

Preston T.C. Erection of 115 dwellings on Savick estate. Engineer and Surveyor, Municipal Buildings.

Manchester Hospital Board has approved in principle provision of new electricity supply at Preston Royal Infirmary.

Rainham. British Plimber Ltd., 19 Albert Embankment, S.E.11, to erect new factory and plant on 10-acre site. Firm will make chipboard from wood shavings.

Reading. Plans in hand for erection of factory in Commercial Rd for Rudic Products, 15a Church Rd, Caversham.

South Shields T.C. Erection of 62 houses on Simonside estate. Borough Engineer, Town Hall.

Southampton. Factory proposed for Skinners (Redbridge) Ltd., 30 Coniston Rd, Redbridge, Totton. Architects are Fowler, Grove and Haggar, 140 Lodge Rd.

Wallasey T.C. Scheme prepared for £400,000 scheme for rebuilding blitzed area in Church St, Egremont. It includes 5-storey maisonnettes over shops, 2-storey office blocks, 3-storey maisonnettes over flats, 11-storey block, terraced houses, 4-storey maisonnettes, comprising some 18 buildings altogether.

Watford. New office building in Wiggenhall Rd being planned by Hertfordshire Ice and Cold Storage Co., Ltd.

Wednesbury T.C. Construction of 16 houses and 4 bungalows on Beech Rd—Simcox Rd site. C. G. Morrish, Borough Engineer and Surveyor, Town Hall.

West Hartlepool T.C. Work expected to start next May on £56,000 scheme for new fire station.

Woking. Erection of mixed primary school for juniors and infants for R.C. Authorities. Goodhart-Rendel, Broadbent and Curtis, 22 Whitehall, London, S.W.1.

Overseas

Hong Kong. Richard Hua and Co., 103 Victory Hse, Wyndham St, wish to represent U.K. manufacturers of a wide range of domestic electrical appliances—irons, kettles, cookers, heaters, water heaters, refrigerators, vacuum cleaners and others—portable tools, measuring instruments.

Pakistan. Mr Nazir Ahmed, P.S.E., Corpn. of City of Lahore, Punjab, would like to have descriptive literature and quotations for fluorescent tubes for street lighting. Some 2,700 are needed, each about 2½ ft long.

Gazette Announcements

COMPANIES ACTS

Noble and Gregory Ltd. Last day for receiving proofs in respect of intended dividends, 28 Oct. Liquidator is R. Betts, Official Receiver and Liquidator, Government Bldgs, 10 St. Mary's Sq, Swansea.

Bex Electric Ltd. Sixth and final dividends of 9 5/16d. in £ payable today (20 Oct.) at Liquidator's Office, Bedford Row Hse, 58 Theobalds Rd, London, W.C.1.

M.P. Stainless Products Ltd. Liquidator, T. J. M. Macleod, 4 Bucklersbury, London, E.C.4, released as from 20 Sept.

Tungsten Electric Co., Ltd., of 30 Gordon St, London, W.C.1. Petition for winding-up presented on 20 Sept. Winding-up order dated 10 Oct.

Modern Electrical Industries (Export) Ltd. Resolution for voluntary winding-up passed at meeting on 20 Sept. when E. O'Neill of Bywater Villas, Knottingley, York, was appointed liquidator. Liquidation is consequent upon acquisition of control by Modern Electrical Industries Ltd.

BANKRUPTCY ACTS

Receiving Order

Nottingham. Jos. E. Rippin, electrical engineer of Egglestone's Yd, Sherwood Ave, Newark. Receiving order dated, 7 Oct.

Public Examination

Bristol. Enfield W. White, electrical contractor of 5 Greenfield Rd, Southmead. Public examination will take place at The Guildhall, Small St, Bristol, on 2 Dec., at 10.30 a.m. First meeting was on Tuesday (18 Oct.).

First Meeting

Bradford. Keith M. Ashworth and Derek Revell trading together as Ashworth and Revell, electrical contractors, at 265 Bradford Rd, Frizinghall, and 120 Otley Rd, Shipley. First meeting will be at Official Receiver's Office, 20 North Parade, Bradford, tomorrow (21 Oct.) at 11 a.m., and public examination at County Court, Manor Row, Bradford, on 7 Dec., at 10.30 a.m. Receiving Order dated, 6 Oct.

Order for Application for Discharge

Ashton-under-Lyne. Ewart B. Page, electrical engineer trading at 10 and 12 John St, Hyde. Order dated 15 Aug. Order made on 13 Sept., 1946, refusing the bankrupt's discharge, varied and in lieu thereby, his discharge suspended one day from 15 Aug., and that he be discharged as from 16 Aug., 1955.

MEETINGS TO NOTE

THURSDAY, 20 OCT.

I.E.S. (Manchester). Conversazione on Light at College of Technology, Sackville St, —until 22 Oct.

INCORP. PLANT ENGINEERS. (Blackburn). "Repair of Fractured Castings." N. Tinwell. Golden Lion Hotel, 7.30 p.m.

I.E.E. (N. Midland). "Radio Aids to Marine Navigation." Capt. R. G. Swallow, R.N. Ret'd. Elect. Offices, Ferensway, Hull, 7.15 p.m.

I.E.E. (S. Western). Chairman's address by W. J. Guscott. Royal Clarence Hotel, Exeter, 3 p.m.

I.E.E. (Irish). Chairman's address by A. J. Litton. Physical Lab., Trinity College, Dublin, 6 p.m.

CHELMSFORD ENGINEERING SOC. "Lighting of Public Thoroughfares." W. F. S. Debenham. Crompton's Social Hall, 7.30 p.m.

A.S.E.E. (Kent). "Sunvic Controls." Miss J. M. Clapperton. Rose and Crown Hotel, Tonbridge, 8 p.m.

A.S.E.E. (Watford). "Electronics." Clarendon Hotel, Station Rd, 8.15 p.m.

FRIDAY, 21 OCT.

BIRMINGHAM ELECTRIC CLUB. Annual dinner at Grand Hotel, 6.30 p.m.

E.I.B.A. (Essex). Annual Ball at Queens Hotel, Westcliff, 6.30 p.m.

I.E.E. (London Students). Autumn dance at Victoria Halls, Bloomsbury Sq, W.C.1, 7.30 p.m.

SATURDAY, 22 OCT.

A.S.E.E. (Oxford and Reading). "Water Heating." A. Hughes. Y.M.C.A., 10 George St, Oxford, 6.30 p.m.

MONDAY, 24 OCT.

I.E.S. (Leeds). Chairman's address by R. R. Cooper: "The Installation, the Engineer and the Local Authority." Lighting Service Bureau, 24 Aire St, 6.15 p.m.

I.E.S. (Leicester). "Special Effects for TV Studio Productions." A. M. Spooner. Elect. Offices, Charles St, 6 p.m.

I.E.E. (Mersey and N. Wales). "Design, Performance and Application of Miniature Circuit-Breakers." H. W. Wolff and T. G. F. Atherton. Town Hall, Chester, 6.30 p.m.

I.E.E. (N. Eastern). "Problems of Hydro-Electric Design in Mixed Thermal-Hydro-Electric Systems." T. G. N. Haldane and P. L. Blackstone. Neville Hall, Newcastle, 6.15 p.m.

I.E.E. (S. Midland Radio). "Colour Television." L. C. Jesty. James Watt Inst., Great Charles St, Birmingham, 6 p.m.

I.E.E. (Western Utilisation). Visit of Utilisation Section Chairman. D. B. Hogg. Electricity Hse, Colston Ave, Bristol, 6 p.m.

TUESDAY, 25 OCT.

I.E.S. (London). Report and discussion on 1955 meeting of International Commission on Illumination. Lighting Service Bureau, Savoy Hill, W.C.2, 6 p.m.

COVENTRY ELECTRIC CLUB. Film: "Planned for a Purpose." Elect. Sports and Social Club, Merrick Lodge, St. Nicholas St.

I.E.E. (London Measurement and Control). "Electrostatic Particle Accelerator," D. R. Chick and D. P. R. Petrie; "Electrostatic Analyser for Absolute Measurement of Proton Energies and Establishment of Fixed Points on High-Voltage Scale," S. E. Hunt, D. P. R. Petrie, K. Firth, and A. J. Trott. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (E. Midland). "Training of the Engineer in the Mining Industry." J. Jeffrey. College of Arts and Crafts, Nottingham, 6.30 p.m.

I.E.E. (E. Anglia). "Automatic Circuit Reclosers." G. E. Peirson, A. H. Pollard and N. Care. Technical College, Collier Rd, Cambridge, 6.30 p.m.

I.E.E. (N.W. Measurement). "Electrical Automatic Control." J. C. West. Elect. Engineering Dept., Manchester Univ., Dover St, 6.15 p.m.

I.E.E. (London Students). Chairman's address: "A.C. Switchgear." M. H. F. Collins. Public Library, Chelmsford, 7 p.m.

WEDNESDAY, 26 OCT.

BRITISH INSTN. OF RADIO ENGRS. (London). Annual meeting. "Recent Advances in Microwave Tubes." Dr R. Kompfner. School of Hygiene, Keppel St, W.C.1, 6 p.m.

I.E.E. (London Supply). Chairman's address by L. Drucquer. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Sheffield). "Repairing Electrical Plant." J. Ashmore. Technical College, Scunthorpe, 7 p.m.

I.E.E. (Rugby). "Colour Television." B. V. Somes-Charlton. College of Technology and Arts, 6.30 p.m.

INST. OF WELDING (N. London). "Part of Resistance Welding in Automation." R. W. Ayers. Mansion Hse, Portland Place, W.1, 7.30 p.m.

A.S.E.E. (Birmingham and Nottingham). Haldane Regional Lecture: "Advent of the Atomic Age." Prof. L. S. Palmer. Regent Hall, Mansfield Rd, Nottingham, 7.30 p.m.

A.S.E.E. (Glasgow). Questions Evening at 39 Elmbank Cresc., 8 p.m.

THURSDAY, 27 OCT.

A.S.E.E. (Kent). Annual dinner at Royal Star Hotel, Maidstone.

FRIDAY, 28 OCT.

I.E.S. (Bath and Bristol). Architects' Night. Royal Hotel, Bristol, 7 p.m.

I.E.S. (Birmingham). "Display Lighting." J. A. Barker. Regent Hse, St. Phillip's Place, Colmore Row, 6 p.m.

INCORP. PLANT ENGINEERS (Birmingham). "Oil Firing." K. J. Luntley. Imperial Hotel, 7.30 p.m.

ELECT. TRADES COMMERCIAL TRAVELLERS' ASSOC. (Midlands). Annual dinner at Queens Hotel, Birmingham.

I.E.E. (N. Staffs). "Proving Performance of Circuit-Breakers," J. Christie, H. Leyburn and J. F. Bird; "New Testing Station for High-Power Circuit-Breakers," J. Christie, H. Leyburn and R. W. Fenn. Technical College, Stafford, 7 p.m.

A.S.E.E. (Sheffield). Annual dinner dance at Devonshire Arms Hotel, Baslow.

MONDAY, 31 OCT.

I.E.E. (London Radio). Series of four papers beginning at 2.30 p.m. and a fifth at 5.30 p.m. Savoy Place, W.C.2.

BUSINESS EFFICIENCY EXHIB. opens at King's Hall, Belfast, closing on 5 Nov. Organisers: Office Appliance and Business Equip. Trades Assoc.

MANCHESTER ELECTRICAL SOC. Presidential address by T. E. Daniel. Hot pot supper. Waldorf Hotel, Cooper St, 6.15 p.m.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

A.T.I. Developments Ltd. 70 High Rd, Broxbourne, Herts. Manufacturers and assemblers of and dealers in electric and electronic apparatus, etc. Nom. cap.: £500. Dirs.: A. T. Izzard, L. D. H. Izzard, and B. G. Izzard.

Kingsway of London Ltd. Mechanical, electrical and general engineers, etc. Nom. cap.: £100. Dirs.: not named. Subs.: F. L. Giles and C. F. T. Wigginton, 5 New Court, Lincolns Inn, W.C.2.

Munns and Co. (Leicester) Ltd., 91 Harrison Rd, Leicester. Electrical and electronic engineers and contractors, etc. Nom. cap.: £2,000. Dirs.: W. C. C. Munns and G. W. Mitchison.

Nuclear Industrial Structures Ltd. Civil, mechanical and constructional engineers, etc. Nom. cap.: £100. Dirs. to be appointed by subs. Subs.: R. G. Page, 41 Whitehall, S.W.1; and A. P. Keogh, 28 Methuen Park, N.10.

Forbes Electrical Industries Ltd. 14 Bedford St, W.C.2. Manufacturers of and dealers in chokes, suppressors, condensers, etc. Nom. cap.: £1,000. Dirs.: W. Roberts and N. Hoad.

Airedale Laboratories (Electronics) Ltd. 16 Hanover Ave, Leeds, 2. Nom. cap.: £1,000. Electronic instrument makers, etc. Dirs.: D. B. Appleby and L. H. King.

Alderton Construction Co., Ltd. Civil, mechanical, reinforced concrete, mining, electrical and atomic power engineers and public works contractors, etc. Nom. cap.: £15,000. Dirs.: not named. Subs.: R. G. Walker and M. C. J. Barber, Basildon Hse, Moorgate, E.C.

C.C.L. Ltd. Electrical and mechanical engineers, manufacturers of components for radio, television and electronic industries, etc. Nom. cap.: £6,000. Dirs.: not named. Subs.: H. E. Goodrich, 3 Field Court, Grays Inn, W.C.1, and Ethel R. Cornell, 245 Manor Lane, Lee, S.E.12.

Arthur Moore (Electrical) Ltd., Fair St, Cambridge. Electrical engineers and contractors, etc. Nom. cap.: £1,000. Dirs.: A. Moore and Mrs E. C. Moore.

Trade Notes

Beama Contract Price Adjustment Formulæ.—*For Electrical Machinery and Equipment.* For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at 15 Oct., 1955, shall be deemed to be 162s.; (*b*) "Cost of Material"—the index figure for materials used in the Electrical Machinery Industry published in the Board of Trade Journal on 15 Oct., 1955, is 193·6.

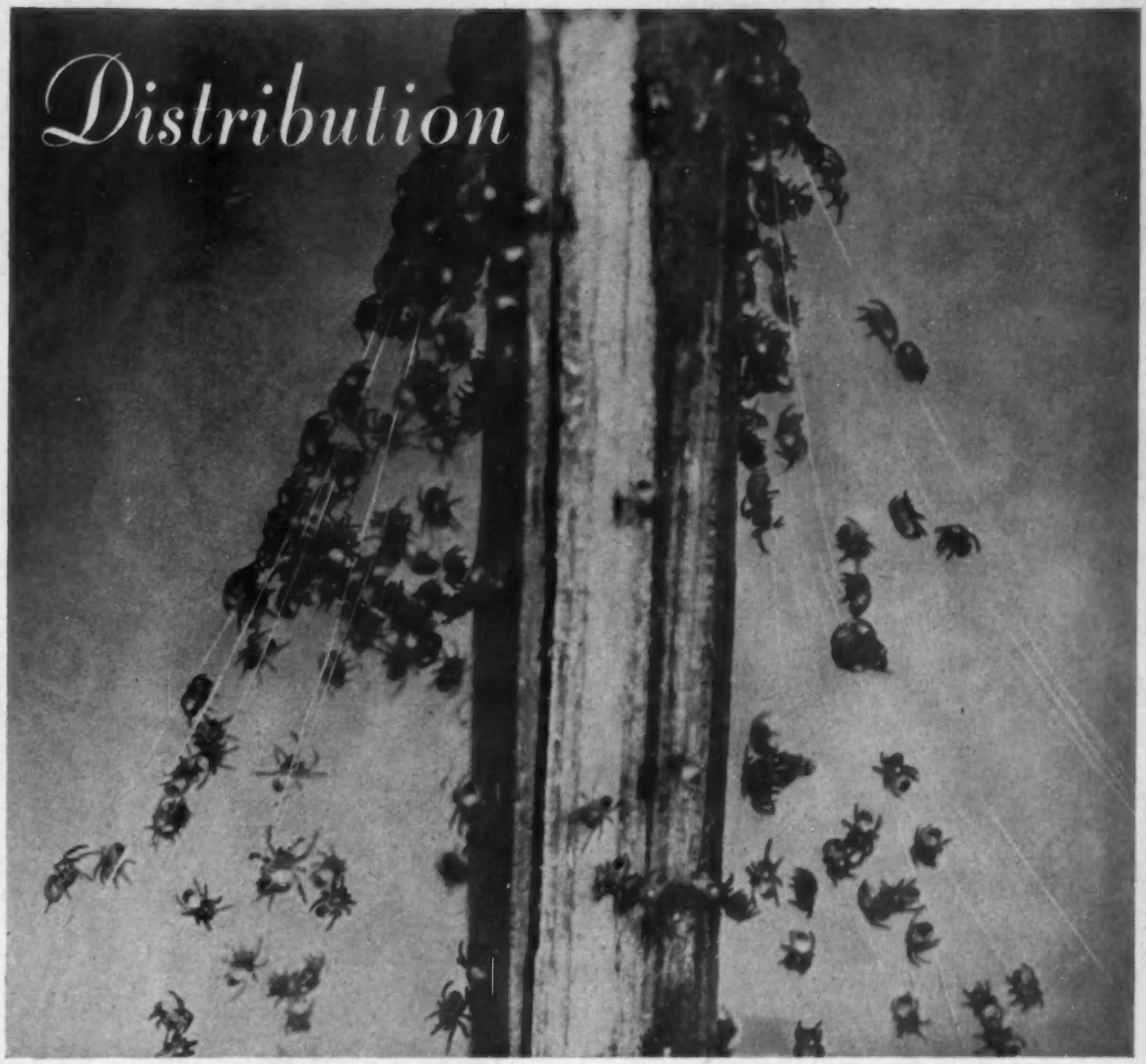
For Turbo-Generating and Allied Plant. For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at 15 Oct., 1955, shall be deemed to be 162s.; (*b*) "Cost of Material"—the index figures published in the Board of Trade Journal on 15 Oct., 1955, are: Materials used in Mechanical Engineering Industries—175·4, "Blast Furnaces and Iron and Steel Melting and Rolling (40 and 41)"—156·1. The price of brass condenser tubes, ¾ in. o/d 18 s.w.g. published in *The Metal Bulletin* on 14 Oct., 1955, is 4s. 4¾d. per lb.

For Outstanding Contracts covered by the B.O.T. Intermediate Products Index. For purposes of calculating variations in (*a*) "Rates of Pay"—the rate of pay for adult male labour at 15 Oct., 1955, shall be deemed to be 162s. (*b*) "Cost of Material"—the index figure for Intermediate Products published in the B.o.T. Journal on 15 Oct., 1955, is 380·4.

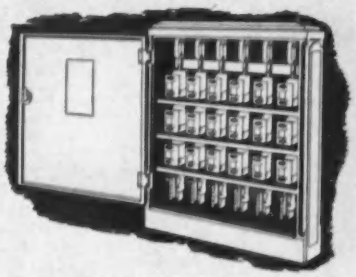
New Telephone No. Telephone number of Dowding and Mills Ltd.'s office at 24-26 White Post Lane, London, E.9, has been changed to Amherst 8351.

Offices and Stores. W. T. Glover and Co., Ltd., are opening two new offices and stores at the end of this month. They are at 41 Bridge St, Aberdeen, (Tel.: 28060), and at 7 Dock St, Dundee (Tel.: 3824). Mr J. Murchie is sales representative at Aberdeen and Mr W. Geekie, branch manager at Dundee.

Showrooms. New London showrooms and offices of Nu-Swift Ltd., at 25 Piccadilly, W.1, have now been completed and opened. Headquarters remain at Elland, Yorks.



Garden Orb Spinning spiders become globe-trotters at an early age. As soon as they emerge from their cocoon they climb to the top of whatever they are on, let out threads of silk and allow themselves to drift away. HENLEY'S Distribution—this time of electricity—is achieved by methods just as ingenious and rather less haphazard. Which is why engineers in every continent rely on HENLEY equipment.

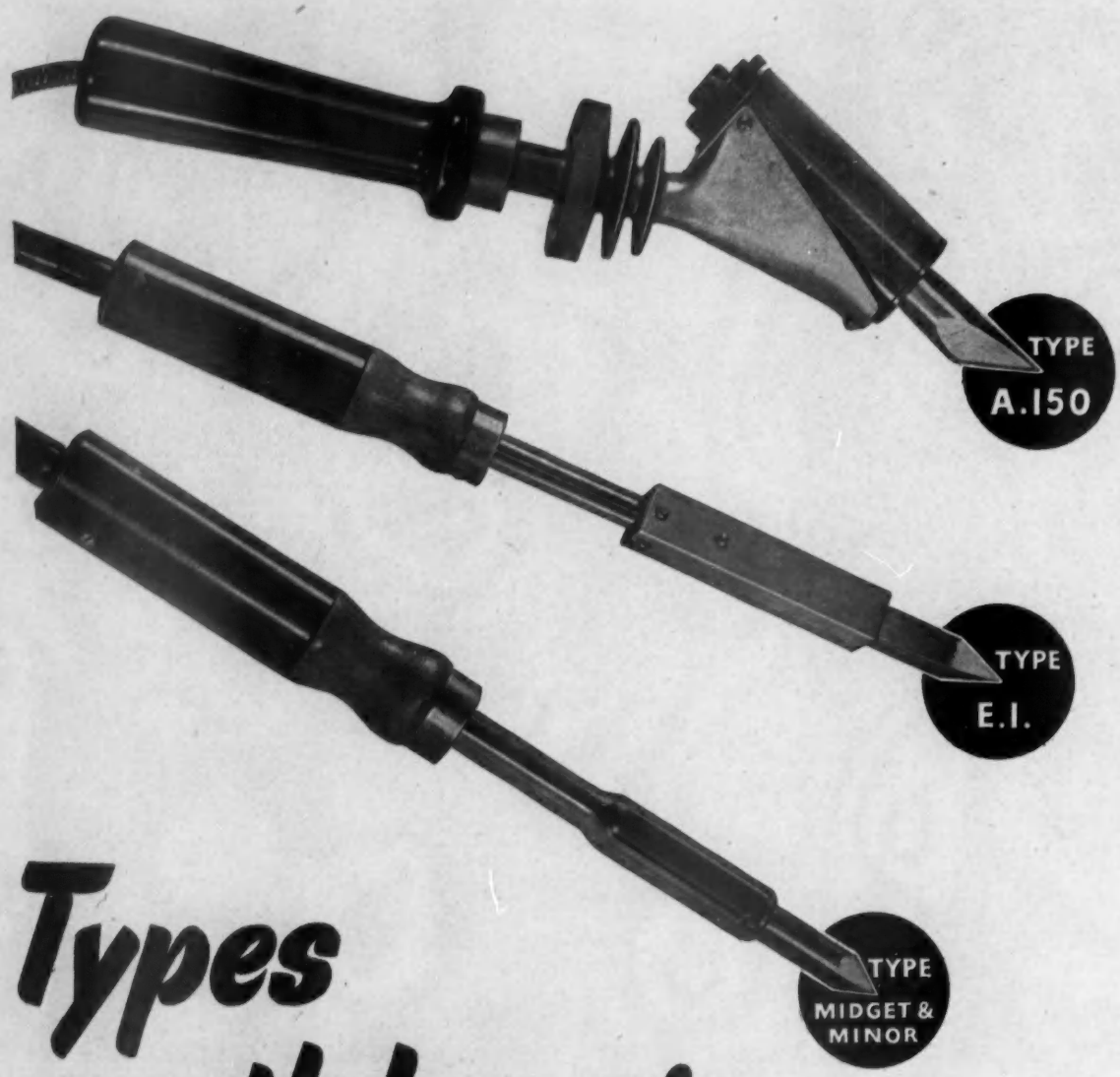


DWARF TYPE DISTRIBUTION PILLAR.
Send for Catalogue 2212.

Electrical Distribution Equipment

by HENLEY

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1



Types worth knowing

British made throughout, the Browleco Electric Soldering Irons are solidly built to stand plenty of hard wear. All parts are renewable and quickly fitted. All Browleco irons are covered by our Guarantee against electrical breakdown for a period of six months Write for leaflet.

GRAngewood 4003 (4 lines)

BROWNING'S ELECTRIC CO., LTD.

BOLEYN CASTLE, UPTON PARK, LONDON, E.13

CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all their classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

TENDERS INVITED

CITY OF PLYMOUTH
Housing Department
ELECTRICAL INSTALLATIONS

TENDERS are invited for the following:
1. The installation of approximately 1,930 socket outlets and approximately 230 spur units in Council dwellings.
2. The supply only of approximately 1,890 bar type electric fires.

Further details, Forms of Tender, addresses of properties, Conditions of Contract and specifications from Housing Manager, Municipal Offices, George St, Plymouth.

Tenders, in plain sealed envelopes, endorsed "Tender: Electrical Installations" but which must *not* bear any name or mark indicating the sender should be addressed to the Town Clerk, Pounds House, Plymouth, and received by him on or before 4 Nov., 1955. (V 574)

SKIPTON URBAN DISTRICT COUNCIL
TRUNK ROAD LIGHTING

TENDERS are invited for:
(*a*) The supply and delivery of 157 No sets of lighting equipment for 400 W mercury vapour discharge lighting, consisting of lanterns, lamps, control gear and time switches, and
(*b*) The supply and delivery of 157 No. steel columns and arms with erection, fitting of the lighting equipment, and bringing the system into service.

Forms of tender, specifications and Bills of Quantities may be obtained from K. B. Robinson, Esq., Engineer and Surveyor, Town Hall, Skipton, on receipt of deposit of one guinea and must be returned to the undersigned, in envelope provided, not later than Monday, 7 Nov., 1955.

Contract drawings may be inspected at the office of the Engineer and Surveyor.

The Council does not bind itself to accept the lowest or any tender, and reserves the right to accept the whole or part only of any tender.

L. E. SMITH,
Clerk to the Council.
(V 461)

MIDDLESEX COUNTY COUNCIL

TENDERS invited for supply and installation of p.i.l.c.s.w.a. cables for power supply, together with lighting and plug circuits, at Mogden Purification Works, Isleworth.

Specification, conditions, and form of tender, obtainable from Chief Engineer, Middlesex County Main Drainage Department, P.O. Box No. 7, Isleworth, Middlesex. Tenders due by 21 Nov., 1955.

The County Council does not bind itself to accept the lowest or any tender.

KENNETH GOODACRE,
Clerk of the County Council.

Guildhall,
Westminster, S.W.1. (V 558)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

TENDERS are invited for the supply and installation of the 11 kV Main Power Cables and Auxiliary Cables at St. Fillans Power Station. Tender Documents may be obtained on application with a cheque for £2. 2s. (returnable) to the Engineers, Messrs Kennedy and Donkin, 12 Caxton St, London, S.W.1. The Board do not bind themselves to accept the lowest or any Tender.

H. W. SIMPSON,
Secretary.

16 Rothesay Terr,
Edinburgh 3. (V 538)

BOROUGH OF NEWARK-ON-TRENT
STREET LIGHTING, TRUNK ROADS A.46 and A.17

TENDERS invited for the following work in connection with the provision of lighting of Group "A" standard on sections of Trunk Roads A.46 and A.17—3,133 yd in length within the Borough.

The supplying and erecting of some 85 concrete columns and 7 steel columns, with a mounting height of 25 ft, including the wiring and fixing of the undermentioned equipment, and putting the installation into operation.

The supplying and fixing of 400 W mercury lighting equipment for the 92 lighting points referred to above.

General Conditions of contract, specification and bills of quantities obtainable on payment of a deposit of two guineas (returnable upon receipt of a bona fide tender) from, and plans inspected at, the office of the Borough Surveyor.

In tendering separate prices must be given for all the various sections enumerated in the bills of quantities, etc., and the Council reserves the right to accept one or more of these as it thinks fit.

Tenders in plain sealed envelopes endorsed "Group A. Lighting," returnable to the Borough Surveyor, by 9 Nov.

The Council does not bind itself to accept the lowest or any tender.

J. H. M. GREAVES,
Town Clerk.

Municipal Buildings,
Balderton Gate,
Newark-on-Trent,
Notts.
14th Oct. 1955. (V 575)

BOROUGH OF LUDLOW
SODIUM DISCHARGE STREET LIGHTING

TENDERS are invited for the supply, erection and putting into service of 53 sodium lighting units of 140 W rating on the major part of the Newport-Shrewsbury Trunk Rd A.49 lying within the borough.

Documents may be obtained from, and drawings inspected at, the offices of the Borough Surveyor at the address below, and completed Tenders, in plain sealed envelopes endorsed "Street Lighting" must be returned to me not later than 5 Nov., 1955.

The Council does not bind itself to accept the lowest or any tender, and any provisionally accepted tender will be subject to the approval of the Minister of Transport.

J. P. MOLONY,
Town Clerk.

Municipal Offices,
Ludlow, Shropshire.
(V 481)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18–64, or a woman aged 18–59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

MAINTENANCE ENGINEER
(Turbines)

required by the Central Electricity Board, Malaya, for one tour of three years on contract. Salary scale (including expatriation pay and present temporary allowance at rate, for single men) equivalent to £1,687 rising to £2,100 a year. Commencing salary according to qualifications and experience. Additional temporary allowances totalling £364/£399 a year (married men) and £567/£630 (family men). Gratuity £280 a year. Opportunity of terminating appointment after one year's service. Free passages. Liberal leave on full salary. Candidates should have served a good works apprenticeship on steam turbine or turbo-alternator manufacture and have had subsequent maintenance experience. They should be capable of supervising the mechanical maintenance of 20 MW Parsons turbo-alternators and associated plant in the Connaught Bridge Power Station and when necessary major overhauls in the Board's other thermal Power Stations. Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers desirable but candidates not holding such qualification will be considered for appointment on slightly lower salary scale. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters full qualifications and experience and quote M2A/41267/EE. (V 560)

THE ATOMIC WEAPONS RESEARCH ESTABLISHMENT
Foulness, Essex

REQUIRES ENGINEERS (Basic Grade) Post (*a*) to design and arrange the manufacture of a wide variety of mechanical equipment ranging from large pressure vessels to instruments, jigs and fixtures. Post (*b*) to design and arrange the manufacture of electronic instruments and equipment. To control a small electronic workshop and effect liaison with the Electronic Production Branch within the Establishment. Applicants should have served a recognised apprenticeship in mechanical or electrical engineering and should be Corporate Members of the Institution of Mechanical or Electrical Engineers (whichever is the more appropriate) or have exempting qualifications. For post (*a*) experience of the design or production of light/medium precision mechanical engineering is essential, and for post (*b*) some experience of the design or production of electronic equipment is necessary.

Salary: £728/£1,130 per annum (Male). Contributory Superannuation Scheme. Housing may be available for married officers at a later date.

Requests for application forms by postcard to Senior Recruitment Officer at A.W.R.E., Aldermaston, Berks, quoting ref. 781/49. (V 539)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SECTION ENGINEER (Operation) required, to be based on Legacy, in the Wrexham District of the Board's No. 4 Sub-Area. Salary within the range £755/£800 per annum (N.J.B. F/7).

Applicants should have had experience in the construction and operation of E.H.T., H.T. and L.T. overhead and underground distribution systems, including indoor and outdoor substation equipment, and should preferably have appropriate technical qualifications.

The appointment is superannuable and subject to medical examination.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, near Wrexham. Closing date: 31 Oct., 1955. (V 551)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Birmingham and District Sub-Area

SECOND ASSISTANT DISTRICT ENGINEERS (SUTTON COLDFIELD AND NORTH-EAST, AND NORTH-WEST DISTRICTS)

Experience necessary in the construction, operation and maintenance of large H.V. and M.V. Distribution Systems. Technical qualifications desirable. Salary £900/£975 per annum (N.J.B. Grade J.7).

Apply in writing, within fourteen days, stating age, experience, present position and salary to Emil Braatnen, Sub-Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

Central Gloucestershire Sub-Area

GENERAL ASSISTANT DISTRICT ENGINEER (SEVERN VALE DISTRICT)

Applicants should have had a sound technical training and experience in the construction, operation and maintenance of overhead and underground systems. Technical qualifications desirable. Salary £595/£640 per annum (N.J.B. Grade E.10).

Apply in writing, within fourteen days, stating age, qualifications and experience, present position and salary to the District Manager, Midlands Electricity Board, Bowling Hill, Chipping Sodbury, Bristol.

Shropshire and Herefordshire Sub-Area

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER (HEREFORD DISTRICT)

Applicants should have had a sound technical training and practical experience in the sale and installation of domestic and commercial electrical equipment and the wiring associated therewith. Technical qualifications desirable. Salary £475/£520 per annum (N.J.B. Grade E.13).

Apply in writing, within fourteen days, stating age, experience, present position and salary to Mr W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

Worcester and District Sub-Area

SALES REPRESENTATIVE (MALE) (KIDDERMINSTER DISTRICT)

Duties include advice to consumers on matters concerning supply, tariffs, apparatus sales, wiring and installation thereof. The successful applicant will be required to complete satisfactorily a two months' residential training course. An adequate allowance will be paid during this period and thereafter the salary will be within the range of £425/£525 per annum (N.J.C. Grade 1).

Apply in writing, within fourteen days, stating age, present position and salary, and details of education and experience, to the District Manager, Midlands Electricity Board, New Rd, Kidderminster.

DEMONSTRATOR (FEMALE) (WORCESTER AND MALVERN DISTRICT)

Applicants must have had a good education and should have a certificate of a recognised Domestic Science Training College and/or the E.A.W. Certificate. Duties include Lecture Demonstrations in Service Centres and on consumers premises and advising consumers on the selection and use of electrical appliances. Salary £425/£525 per annum (N.J.C. Grade 1).

Apply in writing, within fourteen days, stating age, qualifications, training and experience, to Mr R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

A. STEPHENS,
Secretary.
(V 586)

CENTRAL ELECTRICITY AUTHORITY

South Western Division

ASSISTANT SHIFT CHARGE ENGINEER required at East Yelland Power Station.

Superannuation Scheme. Salary, N.J.B. Class G, Grade 9, £715/£760.

Applicants should have had sound technical training and practical operating experience in a modern power station.

Applications on Form A.E.6/ACT, obtainable from your place of employment or the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 5 Nov., 1955. (V 572)

THE NORTH WESTERN ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER, DESIGN AND PLANNING SECTION, SUB-AREA TECHNICAL ENGINEER'S DEPARTMENT, MANCHESTER

APPLICANTS should have received a technical education, preferably to H.N.C. level, or be within one year of this level. It will be an advantage if they have served an engineering apprenticeship or received equivalent training. The duties will include the development of schemes and estimates for extensions to a large city network on voltages up to 33 kV. Excellent opportunities exist for advancement to senior positions.

Salary Scale: £475 x £15—£520 per annum. Grade M.20, N.J.B. Conditions.

Applications to Sub-Area Secretary, No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, by 29 Oct., 1955.

SENIOR ASSISTANT, SUB-AREA CONSUMER'S ENGINEER'S DEPARTMENT, BOLTON

Applicants should have experience of the supervision of Service Centres, organisation of exhibitions and demonstrations, and display.

Salary Scale: £645 x £25—£720 per annum, Grade 4, N.J.B. Conditions.

Applications to Sub-Area Manager, No. 2 Sub-Area, The North Western Electricity Board, 2 St. George's Rd, Bolton, by 29 Oct., 1955. (V 561)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Glasgow Area

APPLICATIONS are invited for the position of:

SECOND ASSISTANT ENGINEER (OPERATION AND MAINTENANCE)

in the above Area.

Applicants should preferably have a wide experience of the operation and maintenance of large underground E.H.V. and L.V. distribution systems, large transformer units and the various types of protection equipment in a densely-loaded industrial and residential area. Experience is also desired of the supervision of work of District Engineers.

Corporate Membership of the Institution of Electrical Engineers or equivalent qualification will be an advantage.

The appointment is superannuable and the salary will be in accordance with the National Joint Board Agreement, Class K, Grade 7, at present £975/£1,050 per annum.

The successful applicant will be required to reside within reasonable distance of the Area Headquarters.

Application should be made on the official form which may be obtained from the applicant's appropriate officer or the undersigned and should be returned not later than 7 Nov., 1955.

A. KELSO,
Manager.

P.O. Box 6,
75 Waterloo St,
Glasgow, C.2. (V 583)

ELECTRICAL INSPECTORS

(Temporary Staff)

BUILDING DEVELOPMENT required by the Federal Government of Nigeria for the Public Works Department for appointment on contract for one tour of 12 to 24 months in the first instance. Salary scale (including Inducement Addition) £810 rising to £1,194 a year. Gratuity at the rate of £100/£150 a year. Outfit allowance up to £60. Free passages for officer and wife. Assistance towards children's passages. Grant up to £150 a year for maintenance of children remaining in U.K. Liberal leave on full salary. Candidates must have had at least five years' responsible experience in electrical contracting work and be able to demonstrate modern methods of installation. Duties will include supervision of the work of electrical contractors and maintenance of electrical installations in Government buildings, hospitals, staff quarters, etc. Knowledge of the electrical maintenance of air conditioning and oil-engine stand-by generating plant is desirable. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2A/41256/EE. (V 573)

THE NORTH EASTERN ELECTRICITY BOARD

Wear Sub-Area

APPLICATIONS are invited for the appointment of DEMONSTRATORS at Chester-le-Street, Consett and Crook.

Applicants should have a certificate of a recognised Domestic Science Training College and/or E.A.W. Certificate, preferably the latter; also considerable experience as a Demonstrator or Assistant Demonstrator in the Electricity Supply Industry. Salary, Grade 1, £425/£525 per annum. Annual increments of £20 up to £465, beyond £465 increments subject to certificate of competence.

Applicants stating age, qualifications and experience to be received by the Secretary, Establishments, The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement. (V 580)

YORKSHIRE ELECTRICITY BOARD

No. 4 (Leeds) Sub-Area

Leeds District

THIRD ASSISTANT DISTRICT ENGINEER

APPLICANTS should be graduates of the Institution of Electrical Engineers or hold equivalent qualifications. They must have wide experience of a large city network in design, construction, operation and maintenance, covering H.V. and M.V. overhead and underground distribution, together with substation equipment. Experience in the changeover of non-standard A.C. systems will be an added advantage.

Applicants must be prepared to reside within the district and undertake standby duties.

Salary—N.J.B. Class K, Grade 9, £840/£20/£900 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, near Leeds, not later than 3 Nov., 1955.

No. 3 (Sheffield) Sub-Area

Mexborough District

FOURTH ASSISTANT DISTRICT ENGINEER

Applicants should have had a good general and technical education up to Higher National Certificate standard with practical training in an engineering workshop or in the Electricity Supply Industry. Some experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution is necessary. Candidates should be prepared to reside in the district.

Salary—N.J.B. Class F, Grade 11, £595/£15/£640 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St, Sheffield, not later than 3 Nov., 1955. (V 564)

THE EAST MIDLANDS ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER—BURTON DISTRICT

APPLICATIONS are invited for the appointment of a Third Assistant District Engineer in the Planning Section of the Burton District of the Derby and Burton Sub-Area.

Candidates should have a technical qualification equivalent at least to the Higher National Certificate in Electrical Engineering, and should have experience in the design and construction of both underground and overhead distribution systems up to and including 11 kV.

The salary will be in accordance with Class F, Grade 9, of the National Joint Board Schedule, commencing at £675 per annum.

Applications stating age, experience, qualifications, previous and present appointments, should be forwarded to Mr F. Overstall, Manager, Burton District, Church Croft, Horninglow St, Burton-on-Trent, Staffs, within 14 days of this advertisement. (V 533)

STATION ENGINEERS (G.D.) AND STATION ENGINEERS (MECH.)

required by Air Ministry at Royal Air Force and Ministry of Transport and Civil Aviation stations. Qualifications required (*a*) Ordinary National Certificate in Electrical or Mechanical Engineering or show that an equivalent standard of technical education has been reached, (*b*) recognised apprenticeship in electrical or mechanical engineering with firm or establishment of good repute, (*c*) three years' employment in electrical or mechanical engineering, preferably on operation and maintenance of mine, factory or workshop plant and services. Preference given to applicants who have had supervisory duties subsequent to (*b*) and (*c*). Work will consist of installation, operation and maintenance of high and medium voltage electrical distribution systems, electrical installations, generating plant, steam and hot water heating systems and miscellaneous works plant tools and equipment. Commencing salary according to age, qualifications and experience on range from £565/£812. Lodging allowance payable in certain circumstances. Liability for tours of duty overseas for which special allowance payable in addition to higher salary. Appointments non-pensionable. Only natural-born British subjects. Write, giving age, full details of qualifications and experience to AB.1255, London Appointments Officer, Ministry of Labour and National Service, 1-6 Tavistock Sq, W.C.1. No original testimonials should be sent. Only candidates selected for interview will be advised. (V 336)

SOUTHERN ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEERS
(TWO VACANCIES)

(*a*) NO. 2 (Newbury) Sub-Area Office Salary £515 x £15—£560 per annum, N.J.B. Class L, Grade 18.

(*b*) Swindon District of No. 2 (Newbury) Sub-Area. Salary £515 x £15—£560 per annum, N.J.B. Class F, Grade 13.

N.J.B. Conditions of Service.

The person appointed to post (*a*) will be required to assist in the Planning Section, mainly in connection with system calculations.

The person appointed to post (*b*) will be required to assist with distribution duties, including minor construction work and general maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant, etc.

Candidates for both posts should possess suitable technical qualifications and the appointments will involve standby duties.

SURVEYOR

Melksham District of No. 2 (Newbury) Sub-Area. Salary N.J.C. Grade 2 (£525/£585 per annum). N.J.C. Conditions of Service.

The qualifications required are a sound knowledge and experience of general survey work with ability to peg overhead lines and prepare profiles and plans from surveyed elevations. Experience of negotiating wayleaves will be considered an advantage.

The successful candidates for the above appointments will be required to contribute to the C.E.A. and Area Boards' Superannuation Scheme, if eligible. Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him in envelopes suitably endorsed, not later than 31 Oct., 1955. (V 571)

SOUTH WALES ELECTRICITY BOARD

require COMMERCIAL ASSISTANT in District 226 (Llanelly), West Central Sub-Area.

The successful applicant will be required to assist in D.C./A.C. Changeover and generally in all commercial duties in the District.

Salary, Class F, Grade 7 (£775/£800) of the N.J.B. Schedule.

Applications stating age, present position, present salary, qualifications and experience and three referees should be addressed to the Secretary (Establishments Section), St. Mellons to arrive by 25 Oct., 1955.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (V 581)

CENTRAL ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS invited for superannuable N.J.M. appointment as STATION SUPERINTENDENT at Newport Power Station which will become vacant in Jan. 1956.

Salary: National Joint Managerial and Higher Executive Grades—Scale 1—£1,250/£1,400 per annum.

Applicants should preferably be Corporate members of the Institution of Mechanical and/or Electrical Engineers and have had considerable experience in the operation, maintenance and administration of a modern Generating Station.

Application forms obtainable from Secretary, South Wales Division, Central Electricity Authority, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 8 Nov., 1955. (V 576)

CENTRAL ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or C. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT ENGINEER (SHIFT)
BARKING A/B GENERATING STATION
Vacancy No. 55/818

Applicants should have experience in operation of E.H.T. switchgear, Station auxiliaries and the control of large Turbo-Alternators. Duties of the successful applicant will be those of First Assistant to the Control Engineer i/c of the Control Room. Salary—Class L, Grade 12=£792. 15s. per annum.

STATION SHIFT CONTROL ENGINEER
BRUNSWICK WHARF GENERATING STATION
Vacancy No. 55/819

Applicants should have had a good general education and technical training with experience in the operation and control of E.H.T. switchgear. Salary—Class K, Grade 10/1=£829. 10s. per annum.

SHIFT CHARGE ENGINEER
ISLINGTON GENERATING STATION
Vacancy No. 55/820

Experience in modern Generating Station operation and E.H.T. switchgear essential. Salary—Class D, Grade 7=£708. 15s. per annum.

SHIFT CHARGE ENGINEER
LOMBARD ROAD GENERATING STATION
Vacancy No. 55/821

Applicants should have a sound technical education together with experience in operation of Boiler House and Turbine House plant. Salary—Class F, Grade 7= £792. 15s. per annum.

ASSISTANT ENGINEER (TECHNICAL)
LOMBARD ROAD GENERATING STATION
Vacancy No. 55/822

Applicants should have sound technical training and be conversant with preparation of Operating Returns. Knowledge of instrument maintenance an advantage. Salary—Class F, Grade 12=£582. 15s. per annum.

STATION SHIFT CONTROL ENGINEER
TAYLORS LANE GENERATING STATION
Vacancy No. 55/823

Applicants should have a good general education and technical training. Previous experience in operation and control of E.H.T. switchgear is essential, together with knowledge of D.C. and A.C. L.T. Distribution and Rotary Converters. Salary—Class F, Grade 10=£666. 15s. per annum.

GENERAL ASSISTANT ENGINEERS
Vacancy No. 55/824

Engineers are required for general duties in Power Stations in the London Division. Opportunities for training in various sections of Power Station work will be given, therefore *Previous Power Station Experience Is Not Essential* provided candidates have had good engineering education and training. Salary—Class AX/EX, within Grade 7=£500/£661. 10s. per annum.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, Central Electricity Authority, London Division, P.O. Box 136, Generation House, Great Portland St, W.1, and be received within 14 days of this advertisement. (V 563)

ENGINEERING ASSISTANT (ELECTRICAL)

required by the Public Works Department, Government of Northern Rhodesia, for one tour of 36 months in the first instance. Salary, according to qualifications and experience, in scale (including present temporary allowance of approximately 20% of salary) £877 rising to £1,171 a year. Gratuity at rate of £100 a year. Outfit allowance £30. Free passages. Liberal leave on full salary. Candidates, aged 25 to 35, must hold O.N.C. in Electrical Engineering, or equivalent qualification, and have had practical experience of installation work. They must be able to prepare designs and drawings for electrical installation work in all types of buildings. Drawings Office experience and a good knowledge of electrical engineering regulations, and standard specifications is essential. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2A/41249/EE. (V 537)

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the post of SECOND ASSISTANT ENGINEER (Protective Gear) in the Technical Section of the Chief Engineer's Department at Edinburgh.

Applicants should possess a Degree or Higher National Certificate in Electrical Engineering and have a thorough knowledge of routine testing and maintenance of protective gear. Previous experience of the testing of generators, transformers, switchgear and transmission lines and their associated control and protective gear, prior to commissioning, would be an advantage. In addition, the successful candidate will be required to co-operate with other departments on electrical problems relating to the construction, operation and maintenance of Power Stations and Grid Substations.

Salary will be in accordance with N.J.B. Schedule C, Class AX/DX, Grade 2, £950/£1,165 per annum.

The position is superannuable. Application should be made on the standard application form, which may be obtained from the undersigned, and returned not later than 4 Nov., 1955.

J. MEEK,
Secretary.

P.O. Box 173,
351 Sauchiehall St,
Glasgow C.2.
12 Oct., 1955. (V 577)

THE FIRE PROTECTION ASSOCIATION

has the following vacancy: MECHANICAL or ELECTRICAL ENGINEER (age 23-26) with degree, or H.N.C. and GRAD.I.MECH. or A.E. and practical experience, to study fire hazards and the whole field of fire protection in relation to all types of industrial processes, and industrial heating and electrical equipment.

This appointment involves a detailed study of causes and methods of prevention of fire, the preparation of reports and advising clients. The successful candidate will have the opportunity to show initiative; after a period of training he will work largely on his own but within a team engaged on similar work on other aspects of fire protection. Salary will be commensurate with qualifications and experience. Non-contributory pension scheme. Applications marked "Private" and giving full particulars and salary required to the Secretary, 15 Queen St, London, E.C.4. (V 462)

INSTITUTE OF ANIMAL PHYSIOLOGY

Babraham Hall
Babraham
Cambs.

ELECTRICAL ENGINEER for maintenance and servicing of all electrical plant, including Diesel-operated emergency generator set, refrigerators, incubators, water stills and all other types of electrical apparatus to be found in a modern laboratory, street lighting, electric motors. Salary scale £565/£695. Superannuation, canteen, a house to rent may be available.

Applications to be made to: The Secretary, within seven days. (V 535)

CENTRAL ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following appointments:

THIRD ASSISTANT ENGINEER (TELECOMMUNICATIONS) TECHNICAL (ELECTRICAL) DEPARTMENT

At Divisional Headquarters in North London.

Salary Class AX/DX, Grade 4-3, £750/£1,090 per annum plus London Weighting.

The appointment will be within one of the above grades depending upon the experience and qualifications of the successful applicant.

Applicants should possess professional qualifications equivalent to the requirements for Associate Membership of the Institution of Electrical Engineers and should have had experience in the design, construction, installation, and maintenance of all types of telecommunication equipment used by the Authority. Ability to control staff is essential and the successful applicant will be required to reside within a reasonable distance of Divisional Headquarters.

SHIFT CHARGE ENGINEER
NORWICH GENERATING STATION

Salary Class F, Grade 7, £755 x £15—£800 per annum.

Applicants should have served an apprenticeship and obtained a Higher National Certificate in Electrical and/or Mechanical Engineering, or equivalent, and possess experience in the operation of Generating Stations.

Applications stating age, qualifications and experience should be sent to the Controller, Central Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by 29 Oct., 1955.

W. N. C. CLINCH,
Controller.
(V 557)

THE EAST MIDLANDS ELECTRICITY BOARD

SECOND ASSISTANT DISTRICT ENGINEER (PLANNING)—BURTON DISTRICT

APPLICATIONS are invited for the appointment of a Second Assistant District Engineer (Planning) in the Burton District of the Derby and Burton Sub-Area.

Candidates should have a technical qualification equivalent at least to the Higher National Certificate in Electrical Engineering; should have experience in the design and construction of both underground and overhead distribution systems up to and including 11 kV; be capable of surveying and profiling for overhead lines and of estimating and preparing schemes for approval.

The successful applicant will be required to reside in or near to Burton-on-Trent, and may be required to undertake standby duties.

The salary will be in accordance with Class F, Grade 7, of the National Joint Board Schedule, commencing at £755 per annum.

Applications, stating age, experience, qualifications, previous and present appointments, should be forwarded to Mr. F. Overstall, Manager, Burton District, Church Croft, Horninglow St, Burton-on-Trent, Staffs, within 14 days of this advertisement.
(V 534)

NORTH WESTERN GAS BOARD
Fylde Group

ELECTRICAL SUPERVISOR—BLACKPOOL WORKS

APPLICATIONS are invited for the above pensionable appointment at a salary within Grade A.P.T. 7 (£620/£700 per annum).

Candidates should have had experience in the installation of D.C. equipment, together with experience of the operation and maintenance of D.C. Prime Movers, D.C. Generators, Rectifiers and H.T. Equipment.

Possession of a Higher National Certificate in Electrical Engineering is desirable and the Ordinary National Certificate is a minimum qualification. Preference will be given to candidates with previous experience of gasworks' type equipment and/or previous experience in a supervisory post.

Detailed applications, giving the names of two referees, should reach the General Manager, N.W.G.B. (Fylde Group), Gas Offices, Princess St, Blackpool, within 14 days.
(V 553)

CENTRAL ELECTRICITY AUTHORITY
East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

MAINTENANCE ENGINEER (ELECTRICAL) LONGFORD POWER STATION, COVENTRY

Vacancy No. 171/55/ET

Applicants should have received a thorough technical and practical training followed by considerable experience in testing protective gear, maintenance of alternators, transformers, switchgear and associated equipment and be capable of taking control of the electrical maintenance staff.

Preference will be given to candidates who are associated members of a recognised Institute or possess similar qualifications.

Salary will be in accordance with Class G, Grade 6 (£840/£900 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 28 Oct., 1955.

THIRD ASSISTANT ENGINEER, GENERATION (CONSTRUCTION) DEPARTMENT

Vacancy No. 173/55/ET

Preference will be given to applicants who have a degree in Civil Engineering, are Corporate Members of the Institution of Civil Engineers or possess equivalent qualifications.

They should have had experience in the design and construction of heavy foundations, river works, structures in reinforced concrete and steel, and other civil engineering works associated with the design and construction of Power Station.

Experience in the preparation of specifications, bills of quantities and estimates will be an advantage.

Salary will be within Class AX/DX, Grade 4 (£750/£950 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 28 Oct., 1955.

ASSISTANT SHIFT CHARGE ENGINEER, FREEMEN'S MEADOW POWER STATION, LEICESTER

Vacancy No. 172/55/ET

Applicants should have experience in the operation of a large pulverised fuel-fired Station. The principal duties will be in the Boiler House. Technical qualifications up to H.N.C. are desirable.

Salary will be in accordance with Class H, Grade 9 (£755 x £15—£800 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 28 Oct., 1955.

SECOND ASSISTANT CHEMIST SPONDON POWER STATION

Vacancy No. 176/55/ET

Candidates must have had a sound technical training and some previous Laboratory experience, and experience in the testing of coal, oil and water will be an advantage.

Preference will be given to candidates who hold the Higher National Certificate in Chemistry.

Salary will be in accordance with Class H, Grade 11 (£675 x £15—£720 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 4 Nov., 1955.

SENIOR DRAUGHTSMAN (ELECTRICAL) TRANSMISSION DEPARTMENT

Vacancy No. 180/55/ET

Experience on H.V. Electrical Equipment associated with Substations and Transmission Systems, including preparation of Electrical Diagrams, preferred, but is not essential.

Salary will be in accordance with Grade 5 (£640 x £20—£740 per annum) of Schedule D of the National Joint Board Agreement.

Closing date for receipt of applications, 4 Nov., 1955.

SHIFT CONTROL ENGINEER DRAKELOW POWER STATION

Vacancy No. 175/55/ET

The minimum requirements are possession of the Higher National Certificate in electrical and/or mechanical engineering, together with experience in the control and load despatching of large capacity steam generating plant connected to the National Grid System.

Salary will be in accordance with Class J, Grade 10 (£755 x £15—£800 per annum) of

continued in next column

continued from previous column

the National Joint Board Agreement.

Closing date for receipt of applications, 4 Nov., 1955.

MECHANICAL MAINTENANCE ENGINEER NORTH WILFORD POWER STATION, NOTTINGHAM

Vacancy No. 177/55/ET

Applicants should have received a sound technical training and wide practical experience in the maintenance of Generating Station mechanical plant and must be capable of planning and supervising mechanical plant maintenance.

Preference will be given to candidates who are Corporate Members of an appropriate professional institution, or hold qualifications leading to such membership.

Salary will be in accordance with Class K, Grade 6 (£1,035 x £30—£1,125 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 4 Nov., 1955.

GENERAL ASSISTANT ENGINEERS, NORTH WILFORD POWER STATION, NOTTINGHAM

Vacancy No. 178/55/ET

The duties of this position are mainly to assist in the Station Control Room on shift, and to carry out such other operation and investigation duties as may be required.

Applicants should have had some previous experience in a Generating Station and preference will be given to those who hold the Higher National Certificate or who are at present pursuing a course of study with the object of obtaining this or a similar qualification.

Salary will be in accordance with Class K, Grade 15 (£595 x £15—£640 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 4 Nov., 1955.

SHIFT CHARGE ENGINEER AVON POWER STATION, WARWICK

Vacancy No. 179/55/ET

Applicants should be suitably qualified and have had experience in the operation of modern boiler and turbine plant.

Salary in accordance with Class E, Grade 7 (£715 x £15—£760 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 4 Nov., 1955.

These appointments will be pensionable within the terms and provisions of the Central Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.
14 Oct., 1955. (V 582)

KENT COUNTY COUNCIL

require SENIOR ELECTRICAL ENGINEER for the design of electrical installations for all types of buildings including liaison work with Consulting Engineers. Salary £825/£1,000. Applicants must be Corporate Members of the Institution of Electrical Engineers with extensive experience in installation work. Application forms from County Architect, Springfield, Maidstone. Closing date, 28 Oct., 1955.
(V 536)

COUNTY BOROUGH OF WEST HAM EDUCATION COMMITTEE
West Ham College of Technology

ROMFORD RD, STRATFORD, E.15

REQUIRED ELECTRICIAN for electrical maintenance of College and Laboratory Equipment in Electrical Engineering Department.

Wages in accordance with current rate of Electrical Contracting Industry. Weekly hours of duty: 44.

Application forms, obtainable from the undersigned, should be returned not later than 4 Nov., 1955.

R. OPENSHAW,
Chief Education Officer.
95 The Grove,
Stratford, E.15. (V 532)

CENTRAL ELECTRICITY AUTHORITY
South Wales Division

Vacancy No. 110/55

APPLICATIONS invited for superannuable N.J.B. appointments as ASSISTANT SHIFT CHARGE ENGINEERS at Tir John and Llynfi Power Stations:

Salary: H.9, £755 x £15—£800 and G.9, £715 x £15—£760 respectively.

H.N.C. and a regular apprenticeship desirable. Experience in a modern Generating Station essential.

Application forms obtainable from Secretary, South Wales Division, Central Electricity Authority, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 7 Nov., 1955. (V 585)

SOUTH OF SCOTLAND ELECTRICITY BOARD
POWER STATION SUPERINTENDENT, PORTOBELLO

APPLICATIONS are invited for the position of Station Superintendent at Portobello Power Station.

Applicants should preferably be Corporate Members of the Institution of Mechanical Engineers or the Institution of Electrical Engineers, with technical and practical experience of the operation and maintenance of a modern steam Generating Station with large high pressure units. They should also have had experience in the administrative duties involved and in the handling of technical and manual employees.

The salary will be in accordance with N.J.M.C. Scale 2. The position is superannuable.

Application should be made on the standard application form, which may be obtained from the undersigned, and returned not later than 11 Nov., 1955.

J. MEEK,
Secretary.

P.O. Box 173,
351 Sauchiehall St,
Glasgow, C.2.
12 Oct., 1955. (V 578)

CENTRAL ELECTRICITY AUTHORITY
North West Merseyside and N. Wales Division

VACANCY No. E.267/379/T.—ASSISTANT SHIFT CHARGE ENGINEER, Roosecote Generating Station, Barrow. Salary £715/£760 (G.9).

Vacancy No. E.267/381/T.—STATION SHIFT CONTROL ENGINEER, Westwood Generating Station, Wigan. Salary £675/£720 (G.10).

Vacancy No. E.267/383/T.—FOURTH ASSISTANT ENGINEER, System Operation Department, Divisional Headquarters. Salary £600/£805 (AX/EX 6). H.N.C. (Elec.) essential.

Applications to Divisional Secretary, Central Electricity House, 825 Wilmslow Rd, Manchester 20, before 29 Oct. Quote vacancy No. (V 562)

MECHANICAL AND ELECTRICAL INSTRUCTOR FITTER
Foreman Linesmen

REQUIRED by the Aden Government Electricity Department for one tour of 18 to 24 months in the first instance. Salary, according to qualifications and experience, in scale (including pay differential) £930 rising to £1,452 a year. Gratuity at the rate of £100/£150 a year. Outfit allowance £60. Free passages. Liberal leave on full salary.

MECHANICAL AND ELECTRICAL INSTRUCTOR FITTER (M2A/41240/EE) must have served a recognised apprenticeship and be able to instruct apprentices in the practical use of workshop tools and equipment commonly used in the electricity supply industry, and to assist in routine power station maintenance.

FOREMAN LINESMEN (M2A/41238/EE) must have served a recognised apprenticeship and have sound knowledge and experience of erecting overhead H.V. and L.V. mains and substation equipment. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience quoting the reference shown against the appropriate post. (V 531)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SECTION ENGINEER required in the Oswestry District of the Board's No. 4 Sub-Area. Salary within the range £715/£760 per annum (N.J.B. E/7). Applicants should have experience in design, construction and operation of E.H.T., H.T. and L.T. overhead and underground distribution systems, including indoor and outdoor substation equipment. Technical qualifications desirable.

The appointment is superannuable and subject to medical examination.

Application forms obtainable from The Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, near Wrexham, should be completed and returned as soon as possible. (V 467)

SOUTH EASTERN ELECTRICITY BOARD

JOINTER OR JOINTER (Extra High Tension)—Central Sussex District.

Wages—Jointer 3s. 11d. per hour; Jointer (E.H.T.) 4s. 1d. per hour for 44-hour, 5-day week under N.J.I.C. Agreement.

Applications, naming two referees, to Arthur Barnes, M.I.E.E., Central Sussex Manager, SEEBoard, Electra House, Church Rd, Haywards Heath, by 2 Nov., 1955.

A. L. BURNELL,
Secretary. (V 579)

CENTRAL ELECTRICITY AUTHORITY
Southern Division

APPLICATIONS are invited for the following post:

FOREMAN, BUILDING MAINTENANCE MARCHWOOD GENERATING STATION, SOUTHAMPTON

S/13.748

Applicants should have served an indentured apprenticeship in one of the building crafts (carpentry, bricklaying, plumbing, etc.) and be fully conversant with all methods of building repairs and construction. Experience in the control of labour is desirable.

Salary: N.J.(B. and C.E.)C., Schedule E, Grade 1, £645 per annum.

Applications, giving full details of education, training, and subsequent experience, with dates, should reach the Station Superintendent, Marchwood Generating Station, Marchwood, near Southampton, by 29 Oct. (V 587)

TECHNICAL ASSISTANTS GRADE I
(Electrical)

required by the Kenya Government Public Works Department, for one tour of 36 to 45 months on contract. Salary scale (including Inducement Pay and present temporary allowance of 10%) £1,003 rising to £1,498 a year. Initial salary according to experience. Gratuity at rate of £123/£183 a year. Outfit allowance £30. Free passages for officer and wife and assistance towards cost of children's passages. Liberal leave on full salary. Candidates, not over 45, must have been trained in a Drawing Office and be able to prepare layout drawings of electrical installation in multi-storey and single-storey domestic and industrial premises and public buildings. They must have a sound knowledge of I.E.E. Regulations. Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2A/41258/EE. (V 559)

CENTRAL ELECTRICITY AUTHORITY

require a SECOND ASSISTANT ENGINEER in the Transmission Design Branch, Bankside House, S.E.1. Candidates should preferably have a University Degree or Higher National Certificate in Electrical Engineering and should have experience in planning transmission systems, making system calculations and estimating costs of schemes. Experience in operating D.C. and A.C. network analysers would be an advantage. Salary within N.J.B. Grade 2, £971/£1,325 per annum inclusive. Applications stating age, qualifications, experience, present position and salary to D. Moffat, Director of Establishments, Winsley St, W.1, by 4 Nov., 1955. Quote Ref.: AE/677. (V 552)

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD

THE Board are engaged on a number of new building and engineering projects, including a new hospital at Welwyn, and the following staff are required to fill a number of newly created posts on the establishment of the Regional Engineer.

SENIOR ASSISTANT ENGINEER—MECHANICAL

This will be temporary post with probably permanency later, mainly to deal with design of new work. Experience in senior capacity desirable. Applicants must be Corporate Members of the Institution of Mechanical Engineers.

Salary scale— £920 x £30 (5) x £25—£1,095 plus £40/£50 London Weighting.

ASSISTANT ENGINEERS—ELECTRICAL, MECHANICAL, HEATING AND VENTILATING

Applicants must be at least (*a*) Graduate members of the Institution of Electrical Engineers, and have passed the Institution examination (lately the Associate membership examination) or recognised exempting examinations; or (*b*) Graduate members of the Institution of Mechanical Engineers, and have passed Sections A and B of the Associate membership examination, or recognised exempting examinations; or (*c*) Graduate members of the Institution of Heating and Ventilating Engineers, and have passed the Associate membership examination, or recognised exempting examinations.

Salary scale—£640 x £25 (4) x £30 (4) x £35 (2)—£930 plus £20/£40 London Weighting.

ENGINEERING ASSISTANTS

Applicants must have O.N.C. or other approved qualification in appropriate engineering subjects.

Salary scale—£480 (age 21 or over) x £20 (7) x £25 (2)—£670 plus £20/£30 London Weighting.

Posts are subject to Whitley Council conditions and are superannuable. Starting salaries may be above minimum having regard to extent of experience since obtaining appropriate qualification.

Apply, stating which post, and giving age, qualifications (with dates) and experience, together with the names and addresses of two referees, to Secretary, North West Metropolitan Regional Hospital Board, 11a Portland Place, London, W.1, by 7 Nov., 1955.

Applicants who have already applied for one of the posts need not re-apply, their applications being at present under consideration. (V 594)

CENTRAL ELECTRICITY AUTHORITY
South Eastern Division

ASSISTANT SHIFT CHARGE ENGINEER—BRIGHTON "A" POWER STATION

APPLICANTS should have had sound technical training and experience in the efficient operation of modern high pressure power station plant and in the control of labour. P.F. experience an advantage. Class H, Grade 9, £755/£800 per annum.

GENERAL ASSISTANT ENGINEER (CHEMIST)—BRIGHTON "A" AND "B" POWER STATIONS

Applicants should possess O.N.C. (Chemistry) or equivalent qualification and possess a good knowledge of elementary chemistry. Class L, Grade 19, £475/£520 per annum.

Applications giving details of education, present position, experience, etc., should be sent to Station Superintendent, Brighton Power Station, Portslade-by-Sea, Sussex, to arrive by 31 Oct. (V 593)

A CHARGEHAND ELECTRICAL FITTER with or without winding experience. Good opportunity for right man with repair shop experience of all types of electric motors. Good rate, 5-day week, overtime, bonus, etc.—Box No. 4879, Electrical Times. (V 448)

ALLEN WEST AND CO., LTD., require DRAUGHTSMEN aged 25-40, works trained and experienced in design and layout of control gear for electric traction. Staff pension scheme, five-day week, salary in accordance with age and experience. Applications in writing giving full particulars to the Chief Draughtsman, Allen West and Co., Ltd., Lewes Rd, Brighton. (V 567)

RESEARCH ENGINEERS

A number of new appointments are to be made in the

Research Department of

D. NAPIER AND SON LTD., LONDON

in connection with work on the aeronautical, marine and heavy electrical and mechanical engineering fields, and particularly on research in the following subjects:

EXPERIMENTAL STRESS MEASUREMENTS AND ANALYSIS BEARINGS, LUBRICATION AND WEAR
DYNAMIC SYSTEM ANALOGUES
GEARING
INSTRUMENTATION
SEALS FOR ROTATING SHAFTS
CONTROL SYSTEMS AND SERVO MECHANISM

Salaries of £1,000 per annum and upwards will be paid to suitable engineers with research or development experience and professional qualifications.

Applications should be sent to:
Dept. C.P.S.,
336/7 Strand, W.C.2
quoting Ref. No. 1417A
(V 540p)

A MAN of character and ability combined with experience and a desire to undertake responsibility is required for an important telephone cable sales and estimating department. Salary will be commensurate with experience and the appointment has good prospects, is permanent and pensionable. Typewritten applications should state salary expected and in chronological order details of experience with salaries received. All applications will be treated in the strictest confidence.—Box No. 4867, Electrical Times. (V 390)

ASSISTANT MANAGER required for Plastics Division Cable Factory—London Area. 3 roomed flat with bathroom provided close to works.—Box No. 4895, Electrical Times. (V 518)

BRITISH Engine Boiler and Electrical Insurance Co., Ltd., 24 Fennel St, Manchester 4. The Company has vacancies for ELECTRICAL PLANT INSPECTORS in various districts in England and Scotland (Dundee). Permanent positions carrying progressive salary scale £600/£850 and non-contributory pension. Candidates age 26 to 30 years with apprenticeship in the manufacture or repair of electrical machinery and preferably with subsequent experience of industrial use of electrical machinery and who have gained the Higher National Certificate in Electrical Engineering or are Graduates of the Institution of Electrical Engineers, are invited to apply in own handwriting stating age, qualifications and experience. (V 570)

DRAUGHTSMEN

M.K. Electric Ltd. require Draughtsmen, preferably with experience in the specialised field of electric wiring accessories. Permanent posts and good salaries are offered with this established and expanding Company. Write in full confidence giving age, qualifications, experience and salary required to:

General Works Manager, M.K. Electric Ltd., Wakefield St., Edmonton, N.18.

(V 599p)

CONNOLLYS (BLACKLEY) LIMITED invite applications for the position of REPRESENTATIVE for their Winding Wire Division in London to cover an area generally south of the Thames. Car provided, superannuation scheme. Applications should state full particulars and salary required. They will be treated in strict confidence and should be addressed to the Sales Manager, Connollys (Blackley) Limited, Kirkby Industrial Estate, Liverpool, and marked confidential. (V 514)

DEVELOPMENT ENGINEER required for work in the laboratories of a large Electrical Company in Shepherds Bush area. Drawing office experience is desirable. General interests and adaptability rather than academic qualifications are required. Pension Fund. Five-day week. Apply in writing to—Box No. 4909, Electrical Times. (V 542)

ELECTRICAL MOTOR DESIGNER required by centrifugal pump manufacturers. Must be experienced in the design and development of medium-sized A.C. and D.C. machines, submersible type motors, etc. Excellent opportunity for qualified, enthusiastic and practical man to improve established and internationally known machines, and to introduce new ideas. The post is one of responsibility and salary will be in accordance. Please send full details, including age, qualifications and experience, to The General Manager, James Beresford and Son Ltd., Stork Works, Kitts Green, Birmingham 33. Applicants may be assured that their replies will be treated as fully confidential. (V 513)

ELECTRICAL FITTER required by the Central Electricity Authority at Nottingham Transmission Section. The work includes the overhaul of existing 132,000 V transmission equipment and in the future 275,000 V transformers and switchgear.

Previous experience of H.V. equipment essential. Rate of pay 49d. per hour, 44-hour week. Terms and conditions of service in accordance with the N.J.I.C. Agreement.

Applications in writing stating age and experience to Divisional Controller, Central Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, quoting Vacancy No. 181/55/ET. (V 584)

ELECTRICAL Manufacturing Company in Central London require an EXPERIENCED MAN capable of handling quotations and tenders for Street Lighting Equipment. This is a progressive position and a senior appointment. 5-day week. Pension Scheme.—Box No. 4917, Electrical Times. (V 547)

ELECTRICAL BUYER required for London Office of Merchant Company operating in Africa and Middle East. Applicants must have practical experience in the handling of Domestic appliances, Radio and contractors' materials. This experience must be supported by adequate technical knowledge and proved commercial ability. Commencing salary according to experience and qualifications. The Company's expanding electrical business will offer opportunity for advancement to the man who can recognise and seize it. Pension scheme and canteen. 5-day week. Write in full to Box No. 9226, c/o Charles Barker and Sons Ltd., 31 Budge Row, London, E.C.4. (V 524)

ELECTRICIANS' MATES required by London Electricity Board in Northern Sub-Area.

Hackney/Stoke Newington District and Poplar District (N.F.E.A. 3s. 8¼d. per hour).

Stepney District and Islington District (N.J.I.C. 3s. 9¼d. per hour).

Application forms obtainable from Personnel Officer, 46/7 New Broad St, London, E.C.2. Please enclose envelope and quote ref.: M/4200/T. (V 556)

ENGINEER required for duties in Contracts Dept., engaged on the preparation of switchgear tenders and their subsequent engineering. Apply The Power Equipment Co., Ltd., Kingsbury Works, Kingsbury Rd, N.W.9. (V 386)

PRODUCTION MANAGER

required by large engineering organisation in the West Country. With a payroll of over 4,000 this is a unit of one of Britain's major electrical engineering enterprises and the appointment, which is a newly created one, calls for a man of wide experience and exemplary record in the control of substantial production units. He is likely, therefore, to be in the 45 age bracket, and will be responsible to the General Manager for the supervision and guidance of the operations of a number of Unit Production Managers.

This is a fully pensionable senior appointment justifying a substantial salary.

Write in strict confidence complete details of age and experience to—Box No. 4915, Electrical Times. (V 545p)

ELECTRICAL ENGINEER—conversant with transformer design and manufacture required by J. Langham Thompson Ltd., 88 High Rd, Bushey Heath, Watford, Herts.

The post offers ample scope for initiative and promotion by ability.

Apply in writing to the Chief Engineer, stating age and full details of experience. (V 568)

EXPERIMENTAL OFFICER required by the Research Laboratory of British Insulated Callender's Cables Limited at Shepherds Bush for the design and construction of experimental apparatus. Applicant should have a good knowledge and experience of electronic equipment. Pension Fund. Five-day week. Applications should be made giving details of qualifications, experience and salary required, to Staff Officer, BICC Limited, 21 Bloomsbury St, London, W.C.1. Ref. L/4/55. (V 598)

FORD MOTOR COMPANY LIMITED, of Dagenham, Essex, have a vacancy in their Power Department for a MECHANICAL ENGINEERING DRAUGHTSMAN. He should have experience of High Pressure Boilers, Turbine and ancillary equipment, together with associated H.P. high temperature steam piping and feed lines. Higher National Certificate essential.

This is a well paid post with participation in a generous non-contributory pension scheme. Please reply to Salaried Personnel Department quoting reference DMT. (V 566)

SALES MANAGER

required to build-up the selling organisation of an important unit in a large electrical organisation. Whilst the product is essentially a technical one, and is already being sold in large quantities to British Industry, it is known that there is a much wider potential than at the moment being exploited. First and foremost the successful applicant will have had a wide experience in selling and sales organisation, and be capable of inspiring a highly specialised sales force, whilst at the same time developing an entirely separate sales operation to electrical wholesalers.

This is a fully pensionable senior appointment justifying a substantial salary.

Write in strict confidence complete details of age and experience to—Box No. 4913, Electrical Times. (V 544p)

SENIOR ENGINEERING EXECUTIVE

required by a large manufacturing organisation in the West Country, with particular interests in the electrical and aircraft fields. This is a newly created appointment and the successful candidate will control a whole range of centralised factory services. Either metal finishing, heat treatment, toolroom or works engineering experience would be particularly helpful.

This is a Senior appointment and a substantial salary will be paid to a man with the breadth of production experience necessary.

A generous pension and life assurance scheme is in operation.

Write full details of age, experience and qualifications in strict confidence to —Box No. 4911 Electrical Times.

(V 543p)

ESTIMATING ENGINEER required for A.C. and D.C. switchgear tenders. Must have experience of flat back and cubicle type gear. Particulars and salary required to—Whipp and Bourne Ltd., Switchgear Works, Castleton, Rochdale. (V 595)

EXPERIENCED TRANSFORMER DESIGNER required in the Manchester district. Technical qualifications up to University Degree standard. Practical experience should include work on distribution and medium power units. Salary level £1,000 per annum approximately, depending on qualifications. Reasonable assistance will be given to obtain a house. Apply stating age and experience to—Box No. 4925, Electrical Times. (V 597)

FOSTER TRANSFORMERS LTD., South Wimbledon, London, S.W.19, have vacancies for DESIGNERS and DRAUGHTSMEN with experience of small transformers. Apply giving full details of experience and salary expected to the Personnel Officer. (V 504)

GEORGE WIMPEY AND CO., LTD., invite applications from ASSISTANT ELECTRICAL ENGINEERS and DRAUGHTSMEN for the design and detailing of lighting and power installations. Applicants must have had drawing office experience and be capable of working on their own initiative. Permanent, progressive appointments. Apply, stating age and brief details of experience, to Department 5 (Electrical), 27 Hammersmith Grove, London, W.6. (V 452)

ELECTRICAL DRAUGHTSMEN

Applications invited from draughtsmen, for employment in Design Drawing Offices, and in Tool Drawing Office, on electrical schemes, equipment, and test rig design.

A number of vacancies exist and attractive commencing salaries will be paid within a wide range according to the age, experience, and qualifications of each applicant.

All posts are pensionable.

Applications to:

Personnel Supervisor,
Hawker Aircraft Ltd.,
Canbury Park Rd,
Kingston-on-Thames.

(V 555p)

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METROPOLITAN-VICKERS ELECTRICAL CO., LTD., require the services of an EXPERIENCED ESTIMATOR for their Valve and Tube Engineering Dept. Applications are invited from men about 30 years of age with experience of estimating for batch production. The post is permanent and pensionable and a good starting salary will be paid to a suitable person. Applications giving full details to: X-Ray Engineering Dept., 68 Ballards Lane, Finchley, N.3. (V 479)

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Deputy Manager—Personnel,
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(V 569p)

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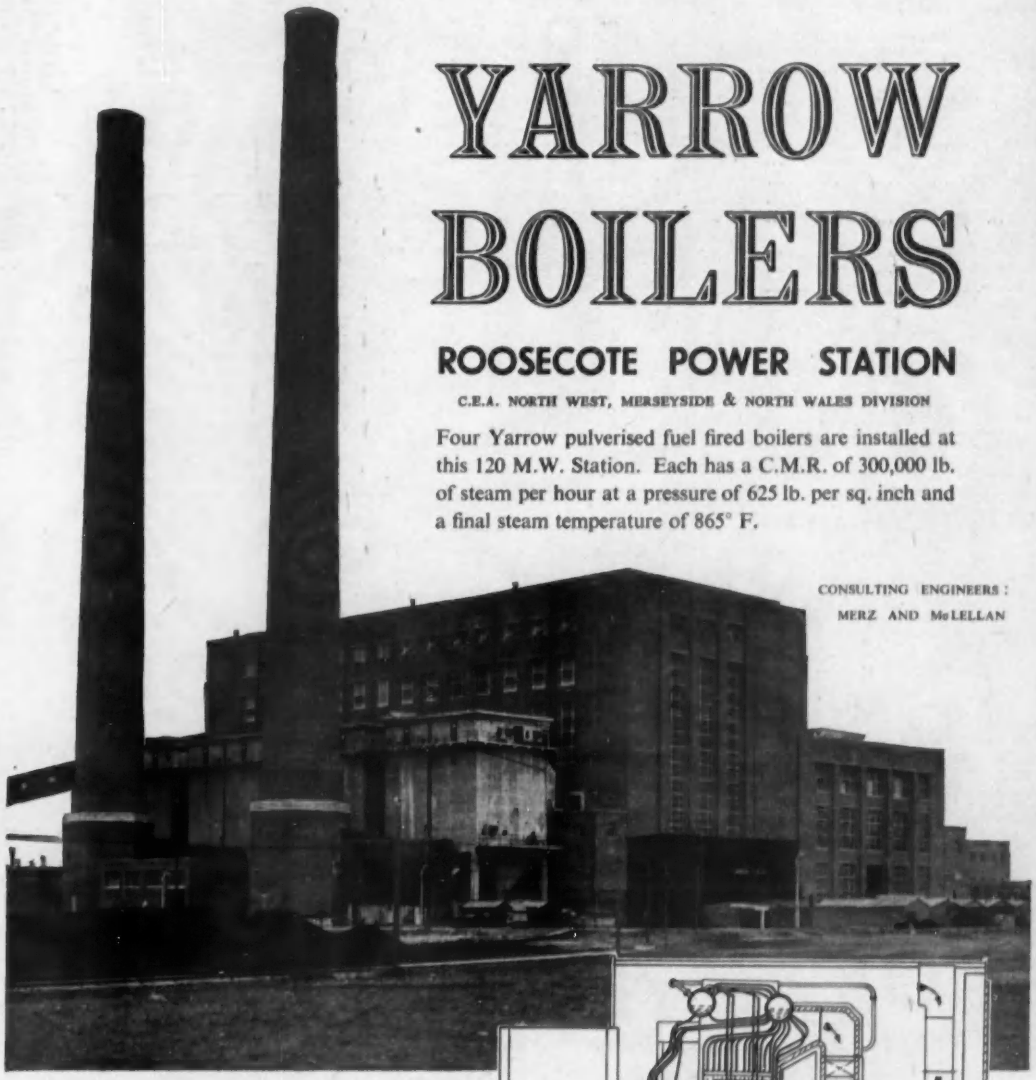

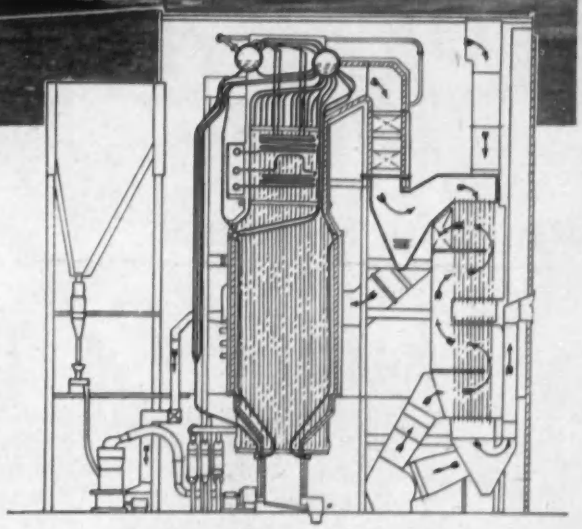

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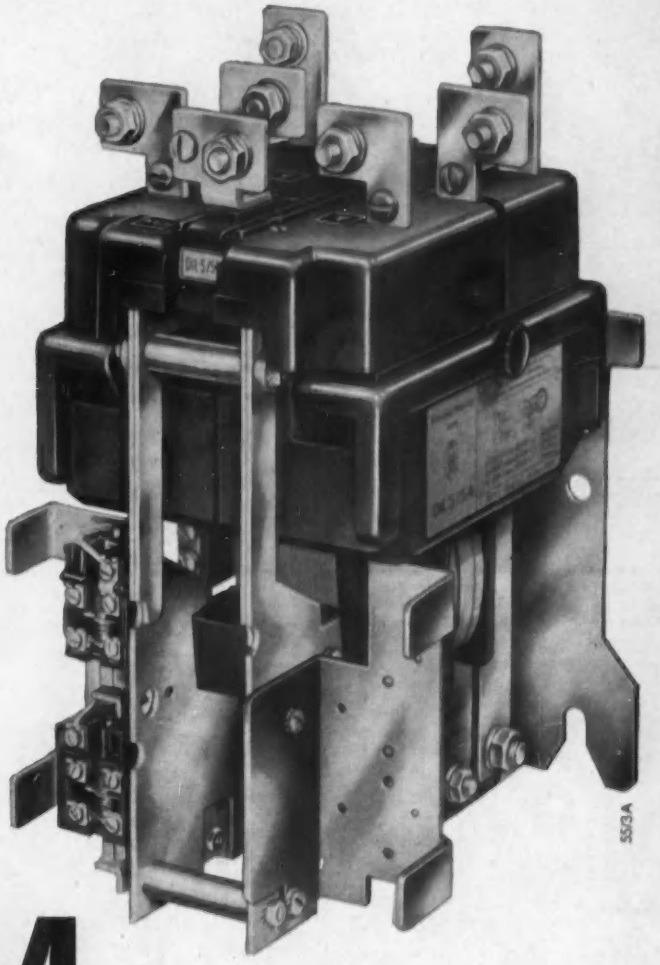

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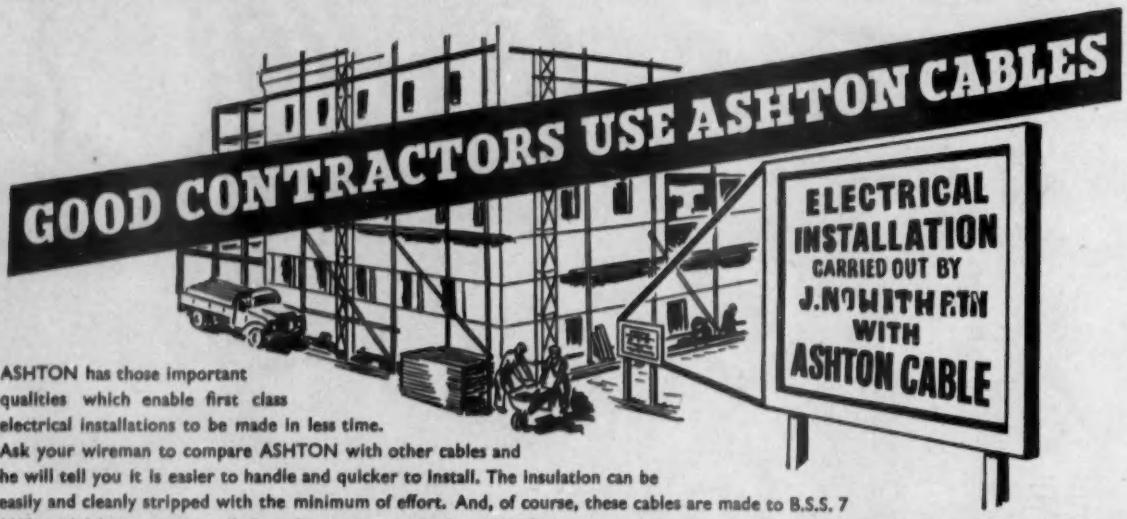

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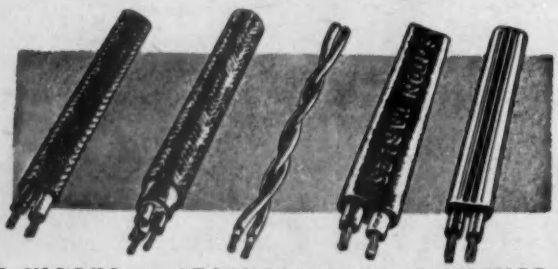

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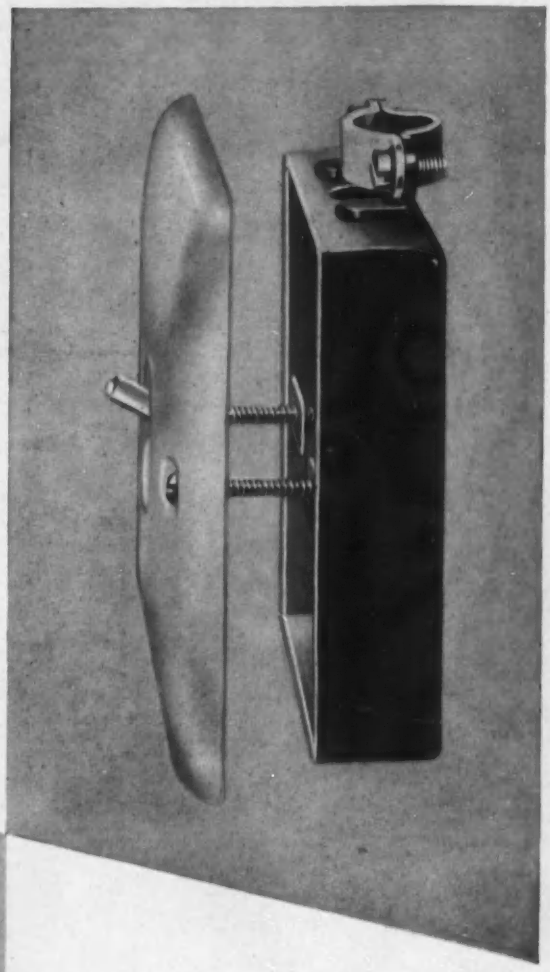

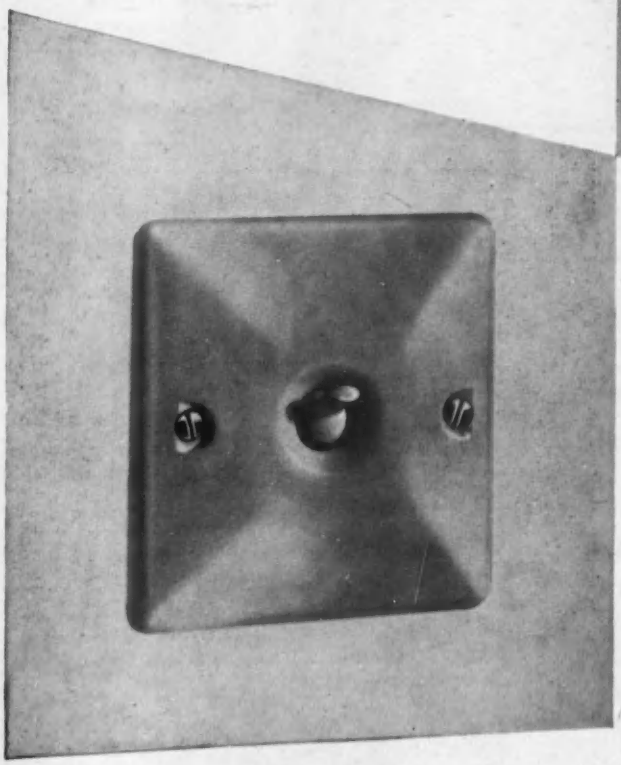

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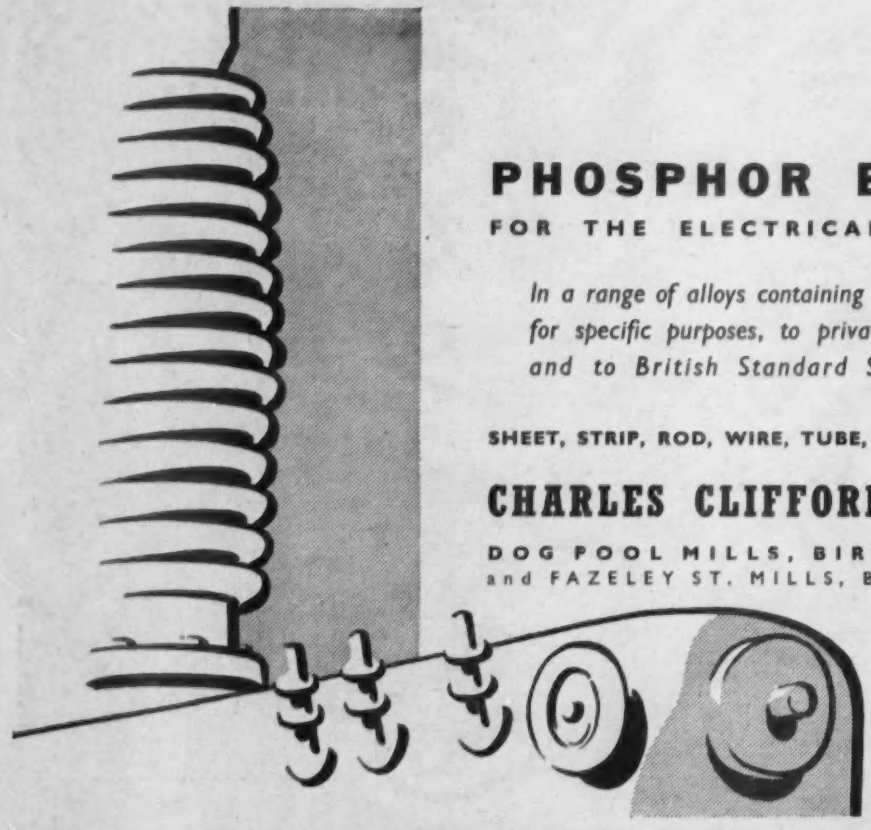

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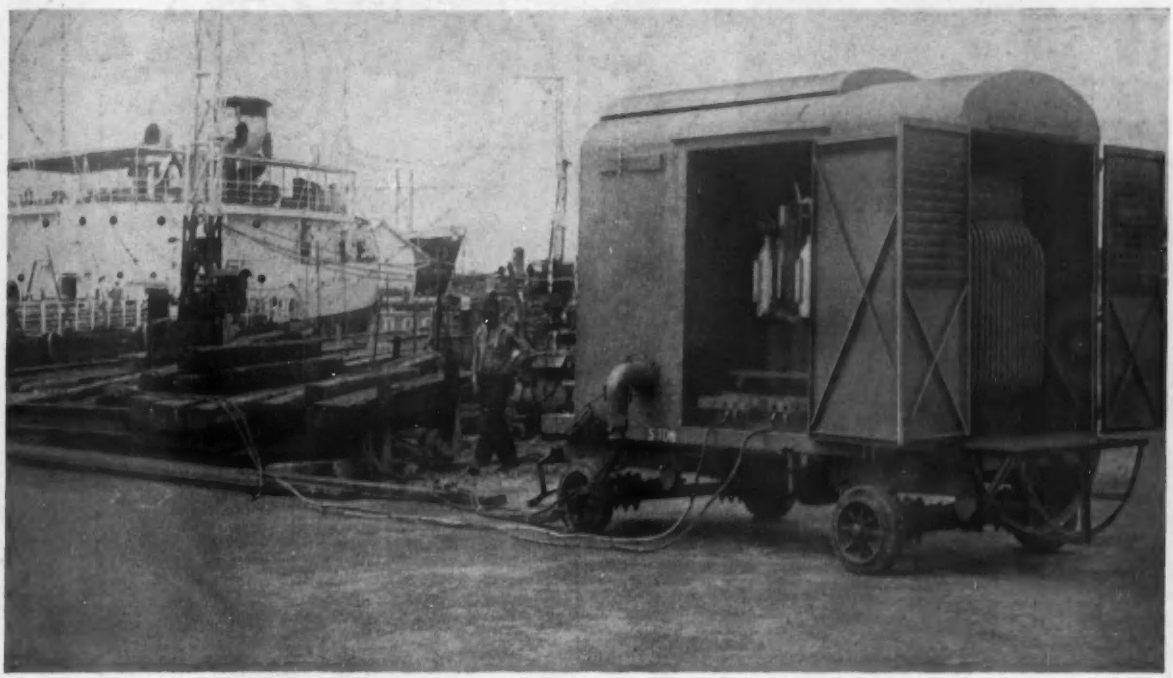

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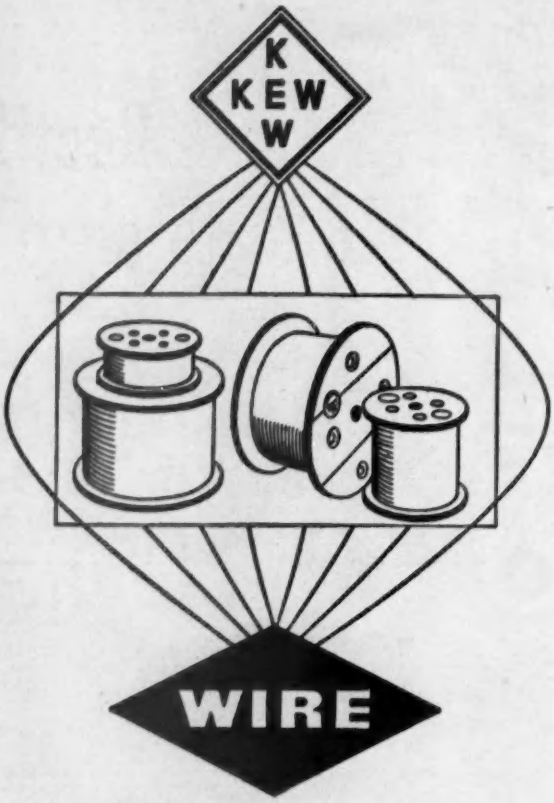

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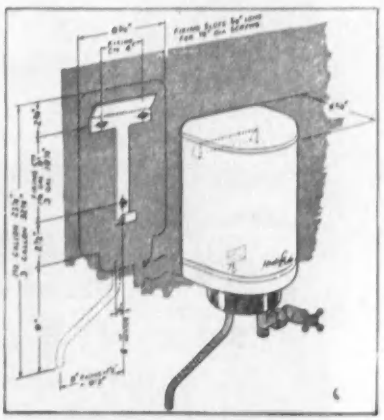

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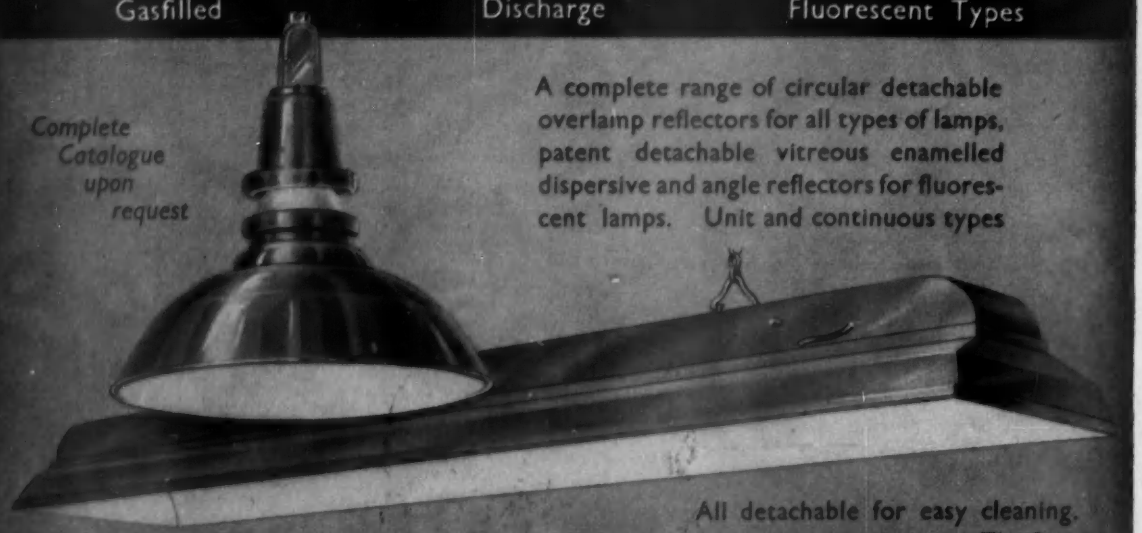

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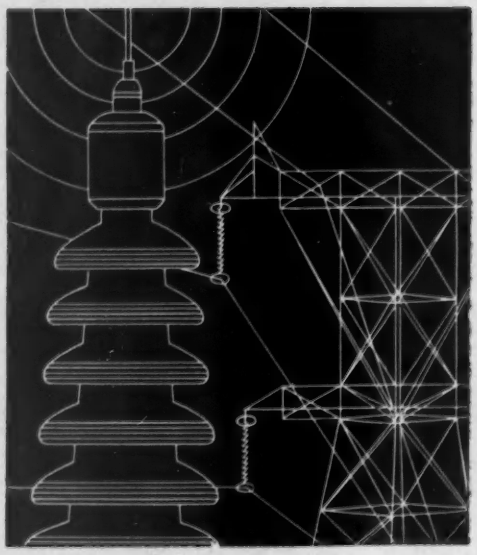

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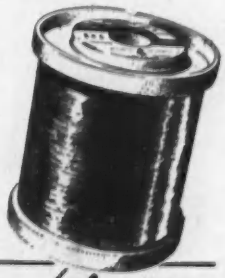

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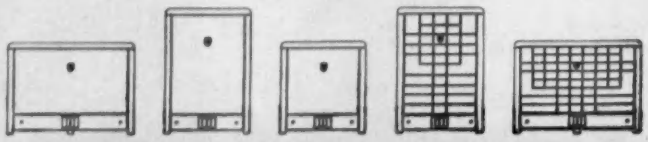

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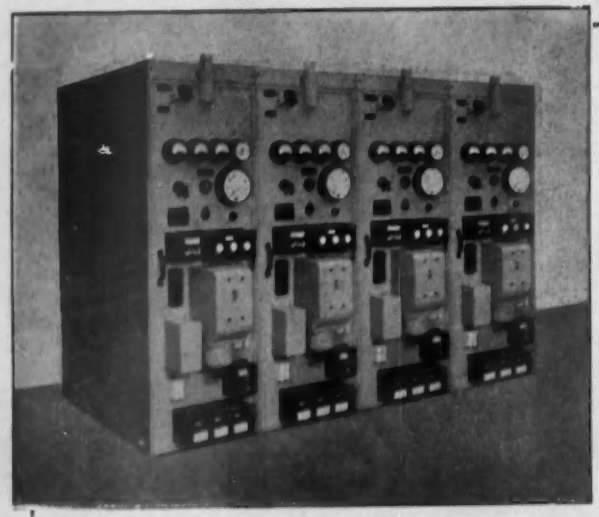

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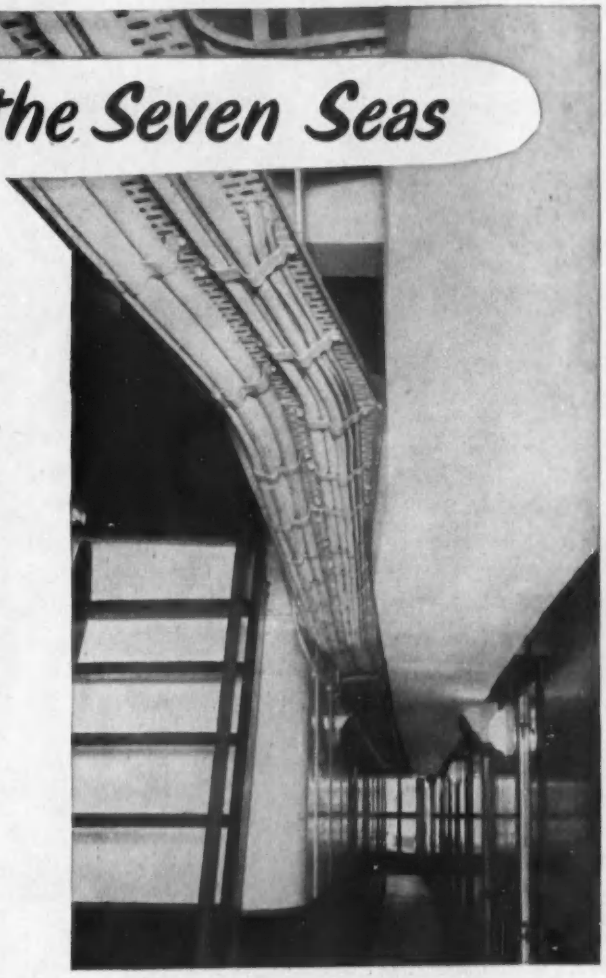

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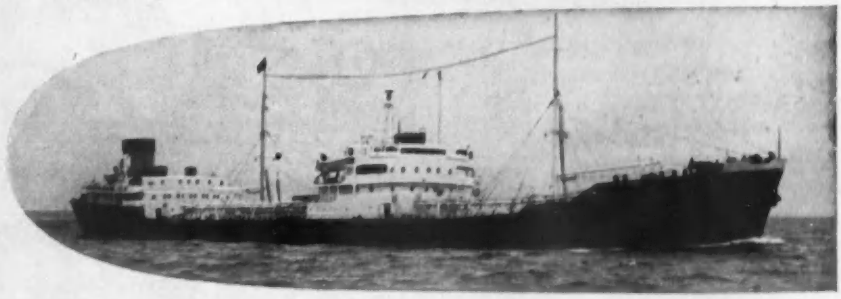

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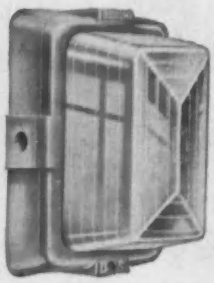
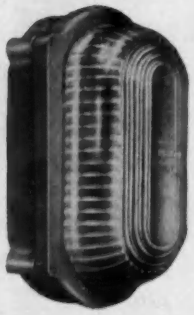
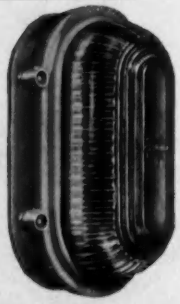


The DIOLUME is a de luxe architectural fitting, diecast in non-corroding silicon alloy. The four conduit holes are conveniently positioned for easy wiring.



The DIOPAL is diecast in high quality silicon aluminium alloy (L.33) with opalescent prismatic glass for wide light dispersion.

The SAFETY DIOLUX has non-splintering perspex closure to prevent broken glass. High light transmission with non-inflammable bonding.



The DIOLUX with chromium plated reflector and special glass for all angle maximum light. Used in H.M.Y. "Britannia" and R.M.S. "Southern Cross". Rust, dust and waterproof.

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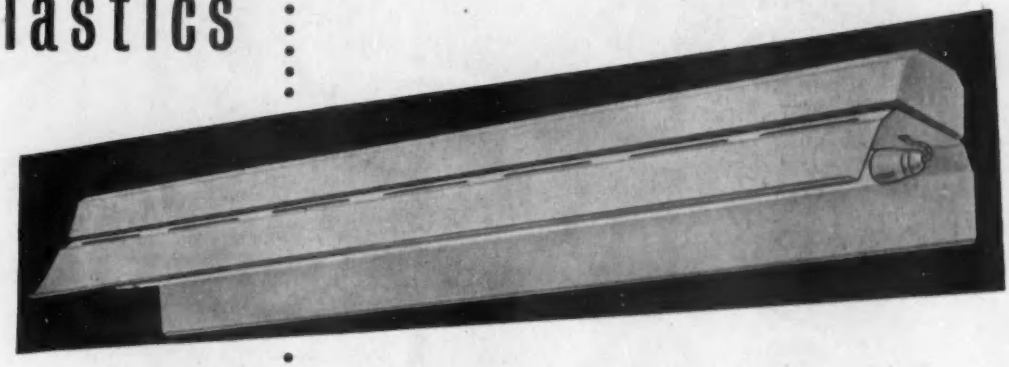
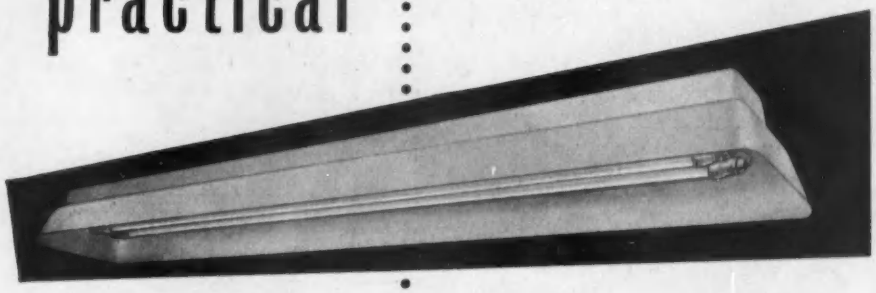


F51006—5ft. P.V.C. Plastic Reflector Fitting
This industrial fitting with a white stoved enamel spine has an almost unbreakable PVC plastic slotted reflector. This reflector is very light, easy to handle and clean, quickly detachable and is resistant to many corrosive atmospheres. For 1, 2 or 3 tubes —4ft. Fitting also available for 1 or 2 tubes.



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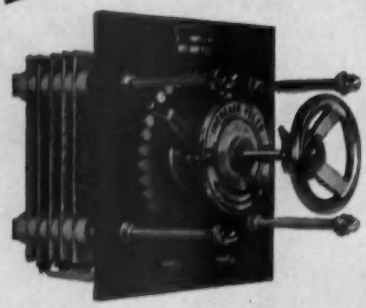

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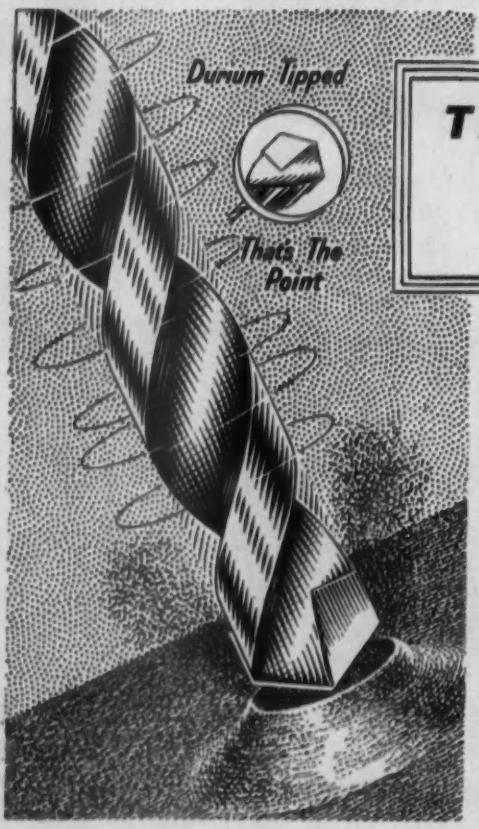

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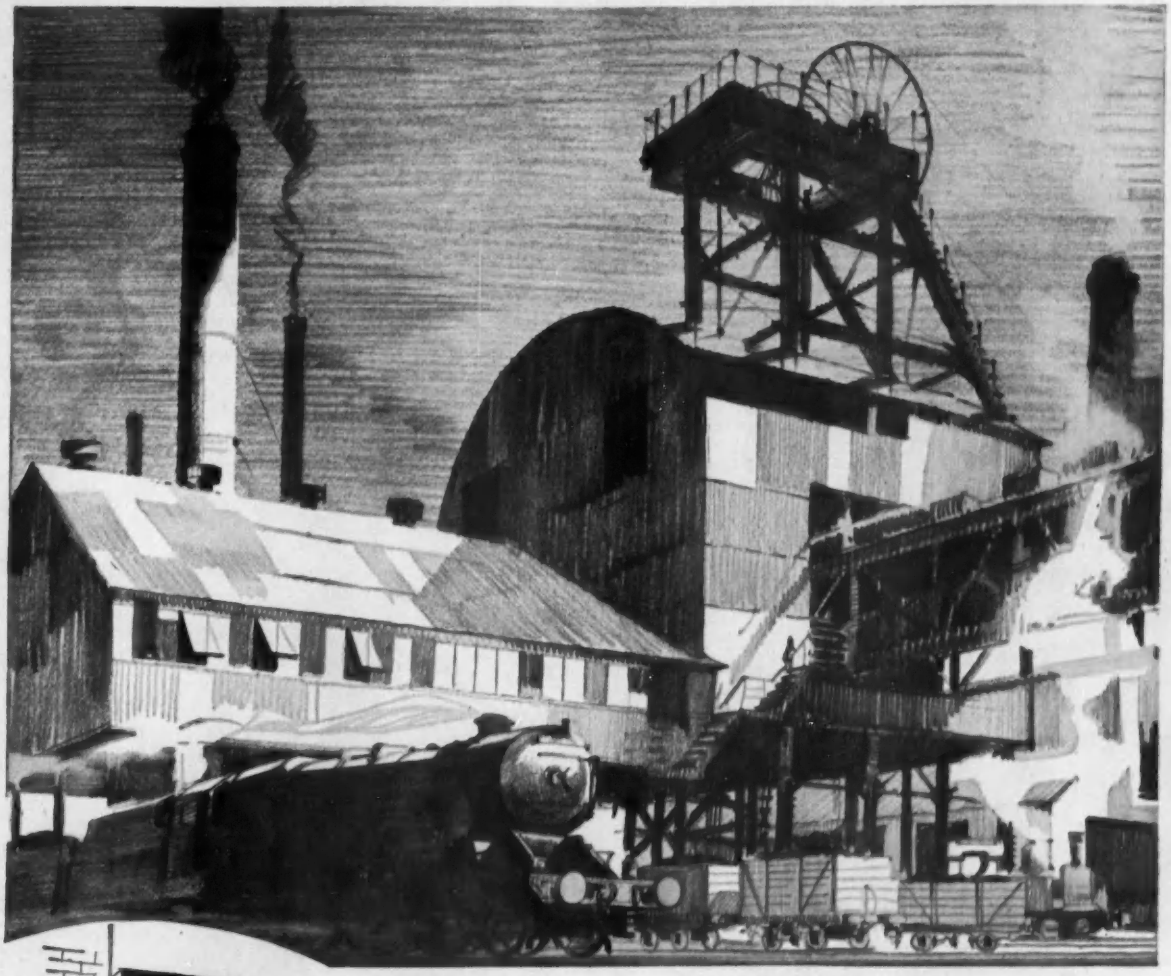

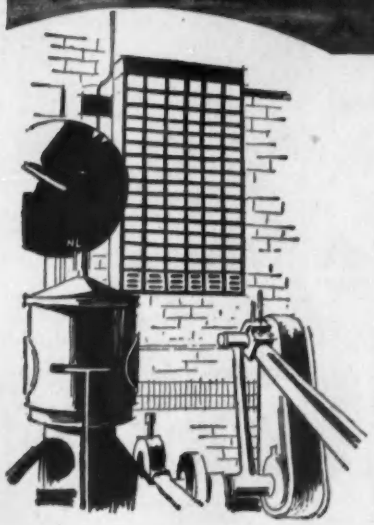

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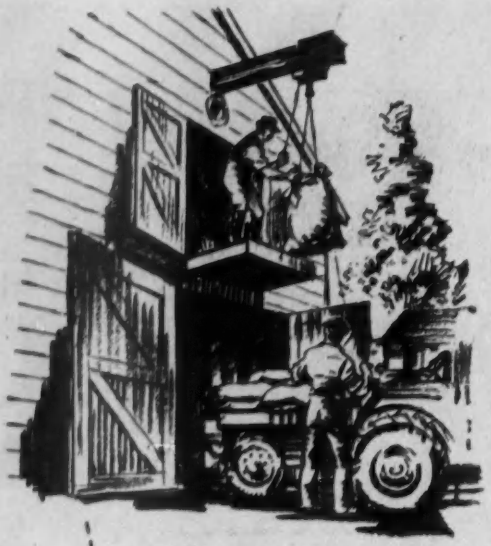

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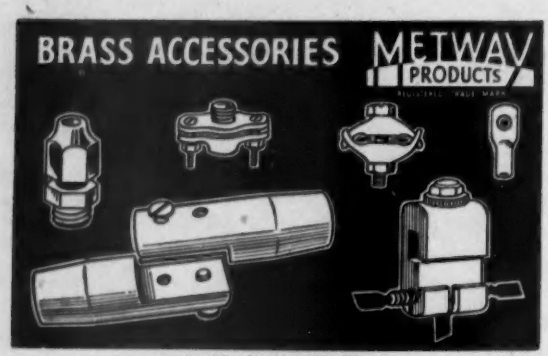

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Type SPA/B/5/50: 5.0 R.M.S. kA at 250 volts.
Type SPA/B/5/0.5: 10.0 R.M.S. kA at 250 volts.

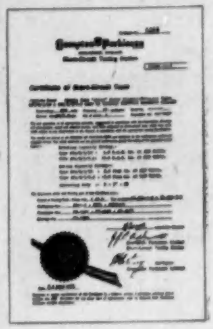
Making Capacity Rating
Type SPA/B/5/50: 8.6 Peak kA at 250 volts.
Type SPA/B/5/0.5: 18.0 Peak kA at 250 volts.
Operating Duty B-3'-MB

Certified Rupturing Capacities

Triple Pole
5 MVA at 550 volts A.C. (5,250 amps.)

Single Pole
5,000 amps. at 250 volts A.C.

Earth Leakage Circuit Breaker (Double Pole)
2,500 amps. at 250 volts A.C.



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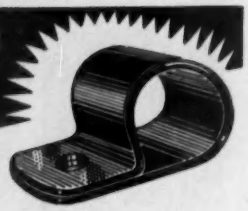

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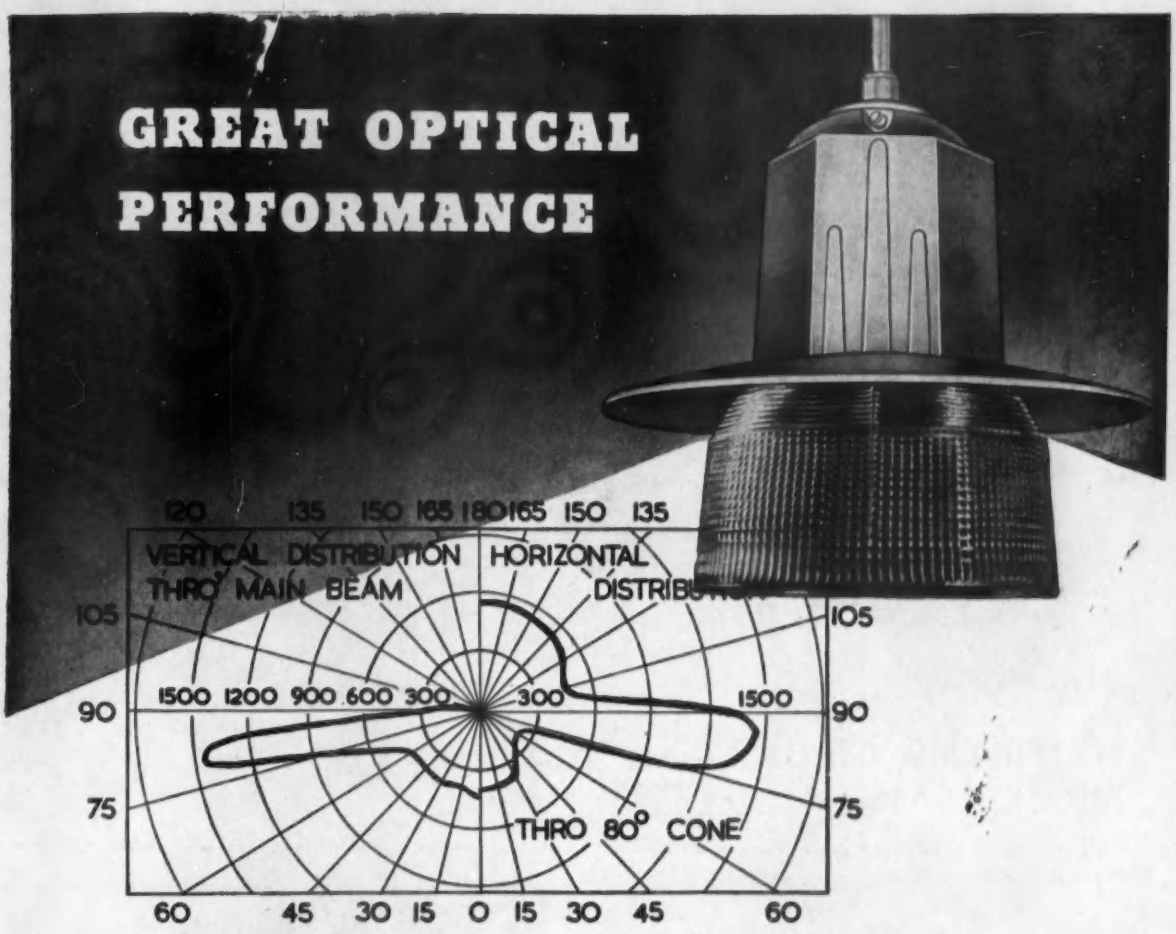

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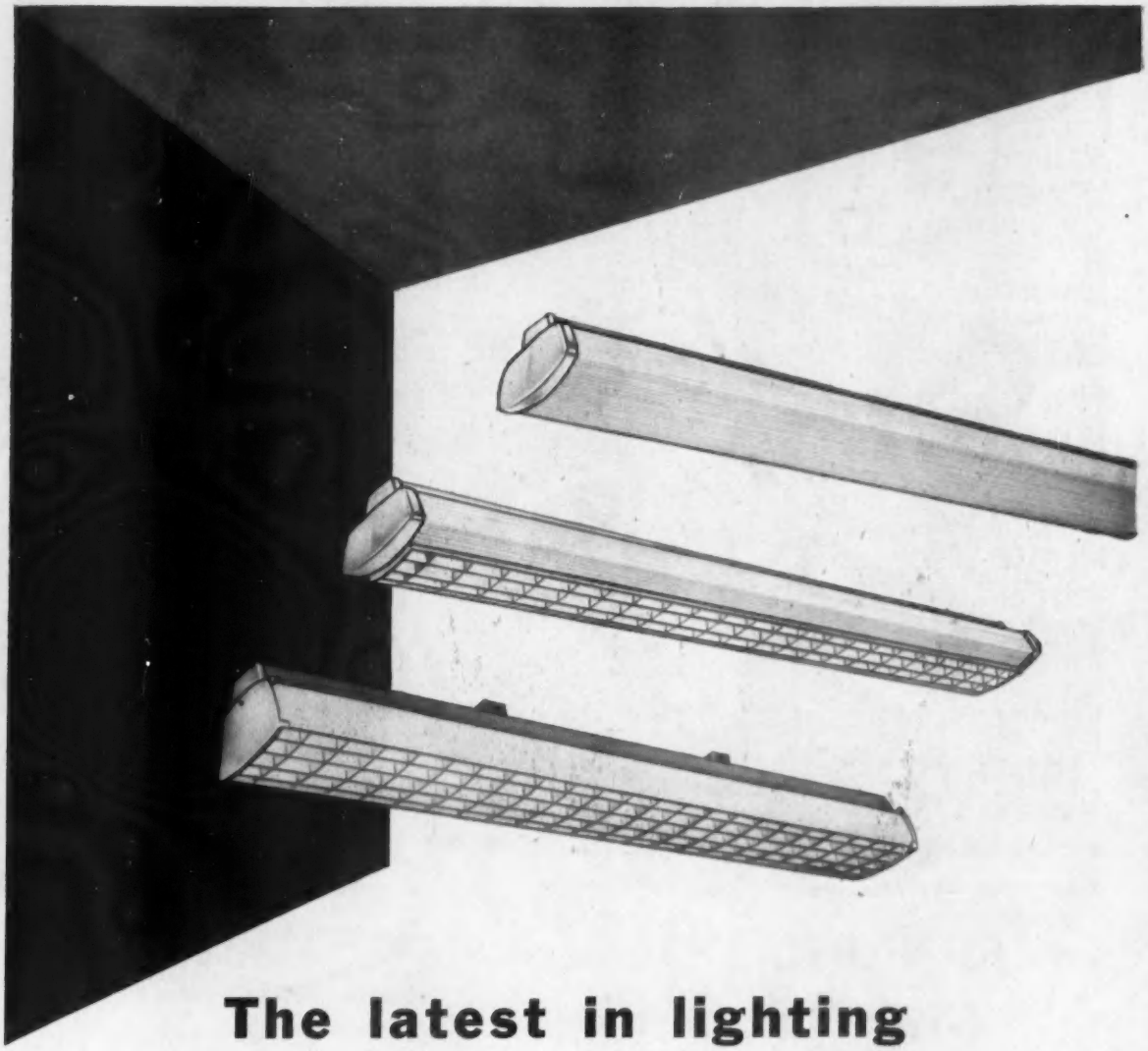

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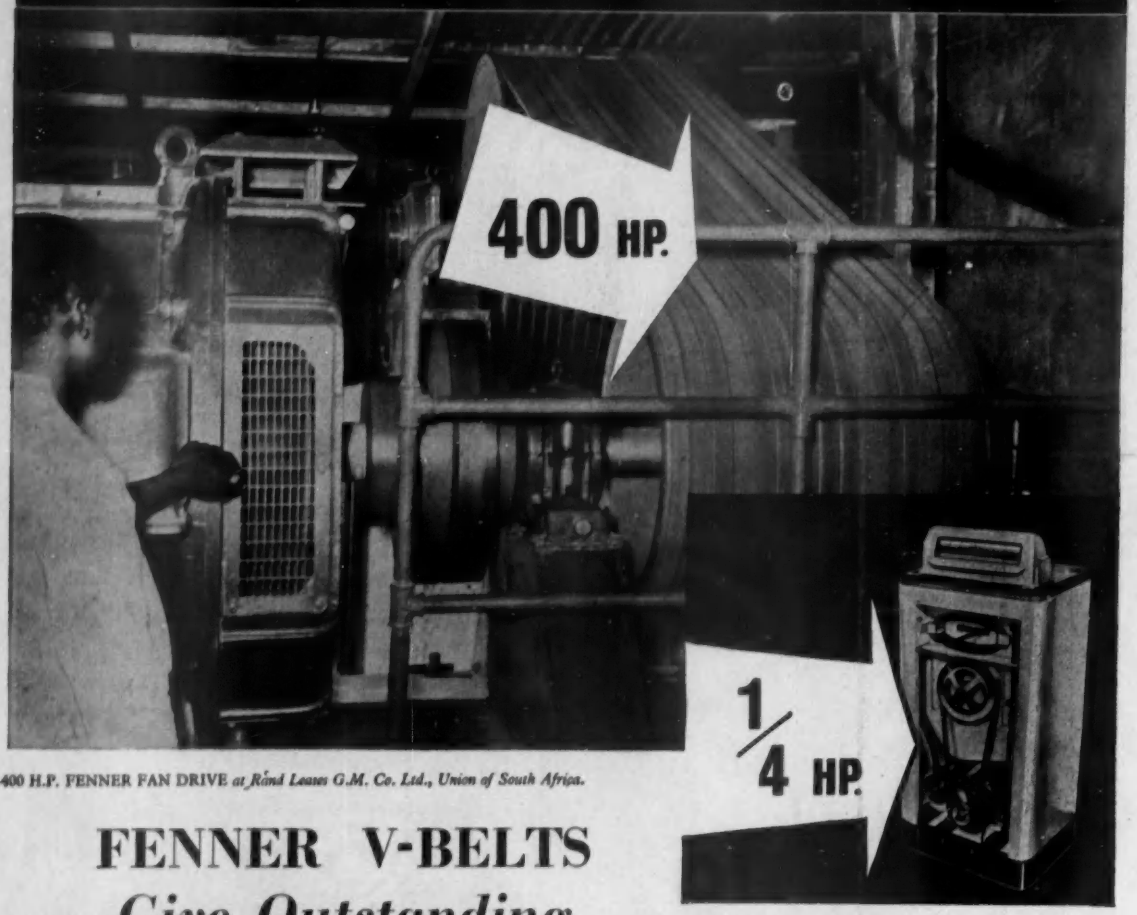

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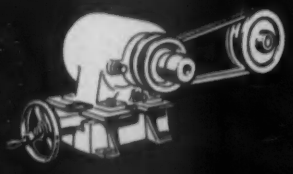

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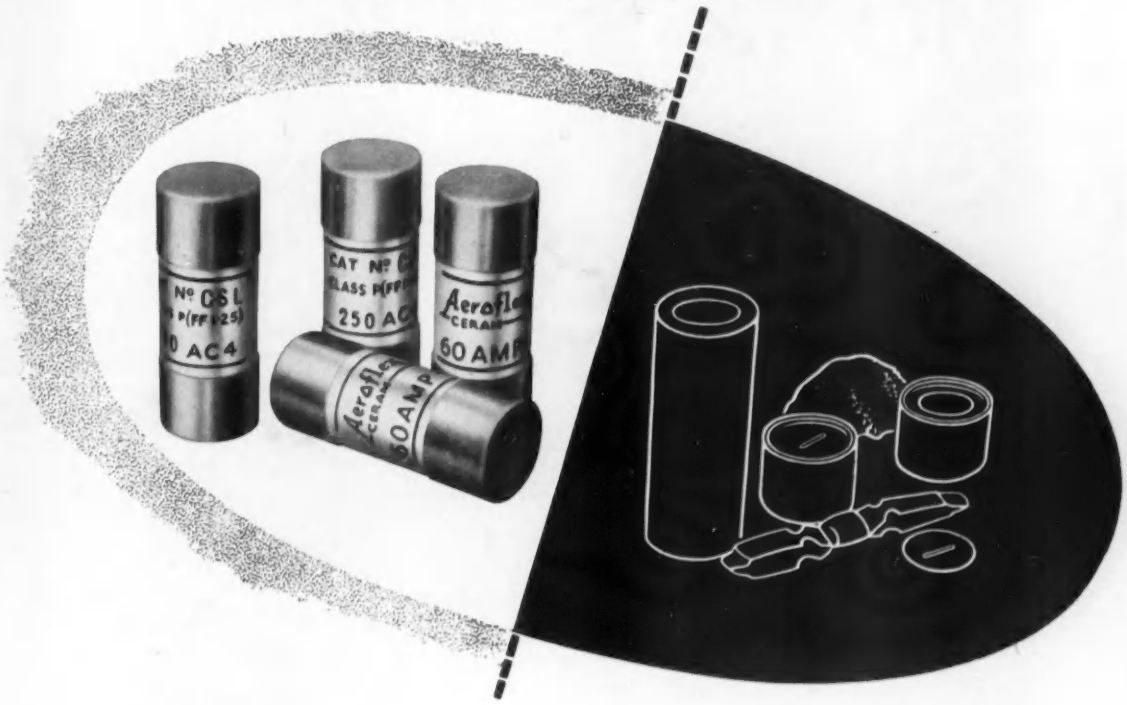

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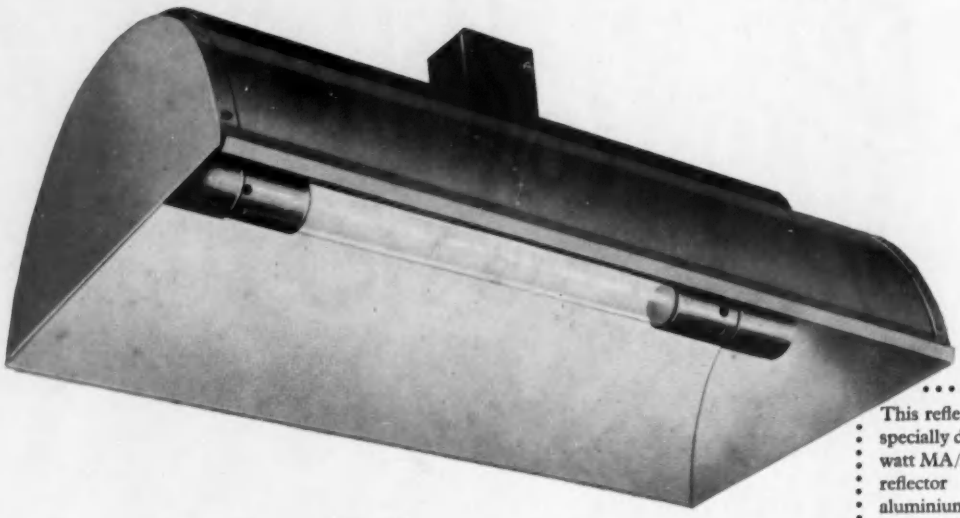

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